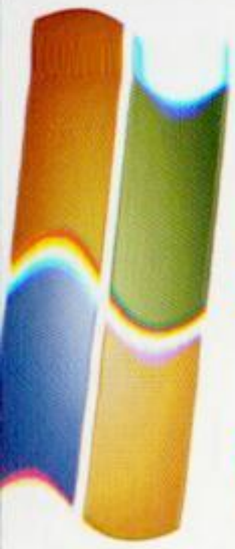

Vista Beta 2 Preview!

The full scoop on the latest version of Microsoft's next OS

750GB Monster Hard Drive!

Holy cow! Seagate's perpendicular mega-drive demolishes our benchmarks!

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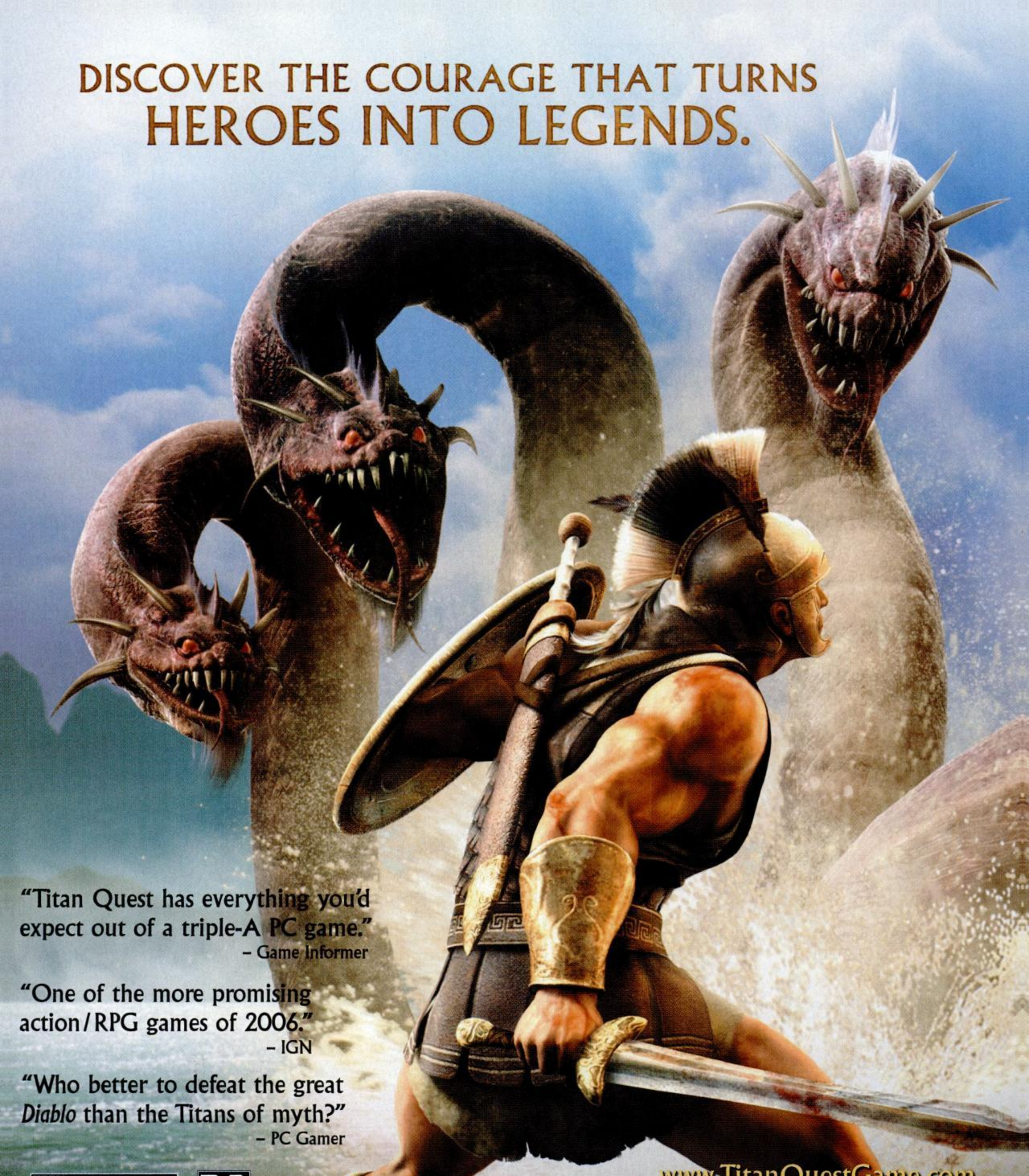

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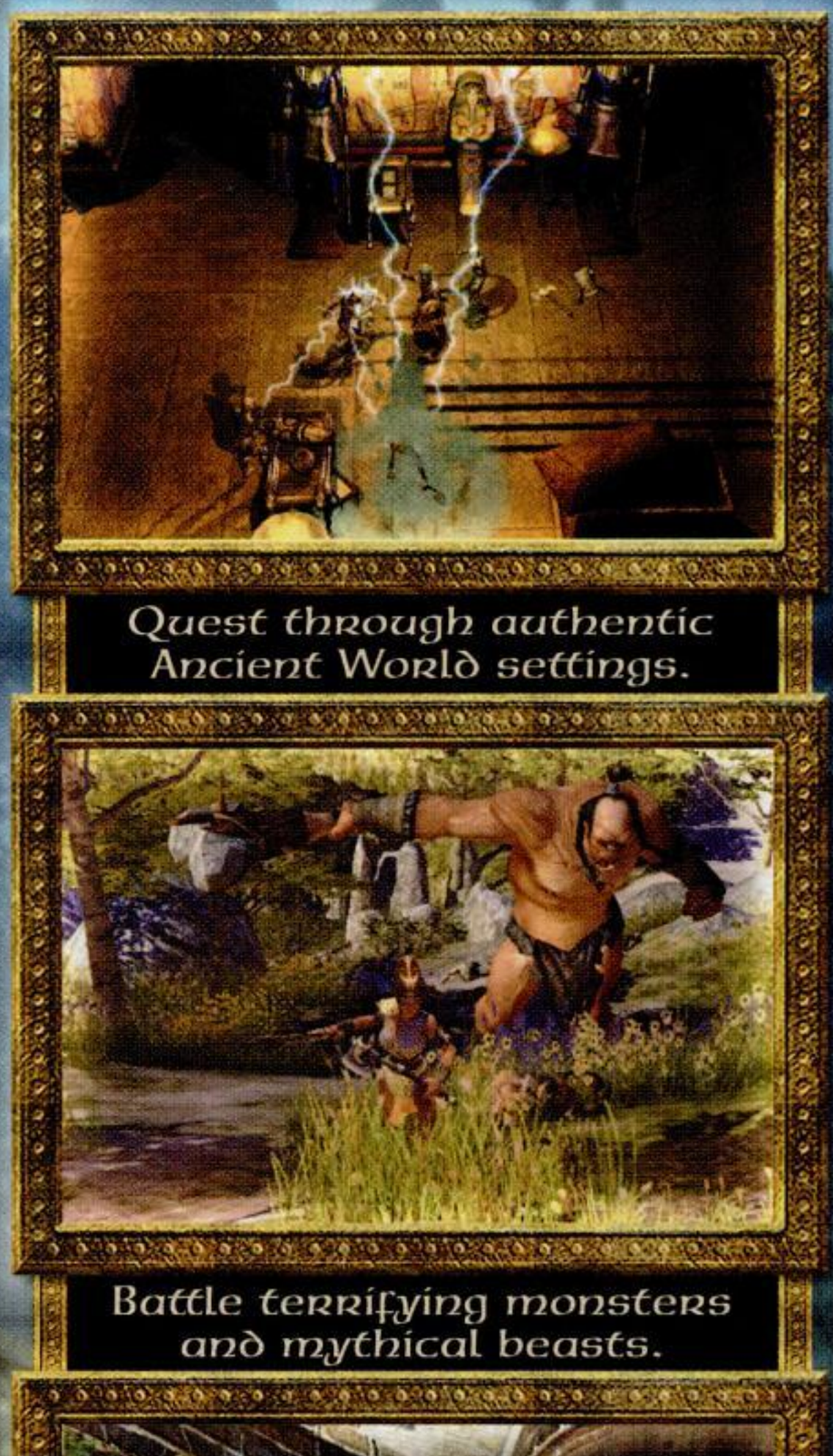

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Ed Word

It's Hard out There for a Power User

Please send feedback and chewy chocolate brownies to ***will@maximumpc.com***

The events of the last few weeks led me to develop a maxim, which I'm going to call Smith's Law #1. Behold: *Computing is more difficult than it needs to be. And frequently, we—the power users, computing experts, and other affiliated nerds—are responsible.*

Sure, it's not exactly an epiphany worthy of hosannas, but it's true. Witness two recent incidents that helped congeal Smith's Law #1 from the "æther."

When I set out to install Windows Vista on my personal gaming rig one late-spring afternoon, I didn't anticipate problems. After all, I'd already installed multiple Vista builds on that rig. Unfortunately, my rig crashed before the graphical installer loaded. After pulling every component from my system, rebooting about 400 times, flashing the BIOS, and spending hours on Google, I found that my mobo's hard drive controller was at fault. The only "fix" is to replace my board with one that uses another drive controller.

So, I have to replace my motherboard. No big deal, right? Wrong. My rig sports the latest in water-cooling technology—normally a good thing. However, swapping out the mobo, which usually takes about 30 minutes, now requires all afternoon, not to mention buckets, clamps, and hoses. Ugh.

The second incident happened while I was writing this month's how-to. I wanted to figure out an easy way to host large files online, using Bittorrent. After testing a ton of insanely difficult-to-configure web apps, I stumbled upon *Broadcast Machine.* It worked perfectly on my home web server, and I started writing.

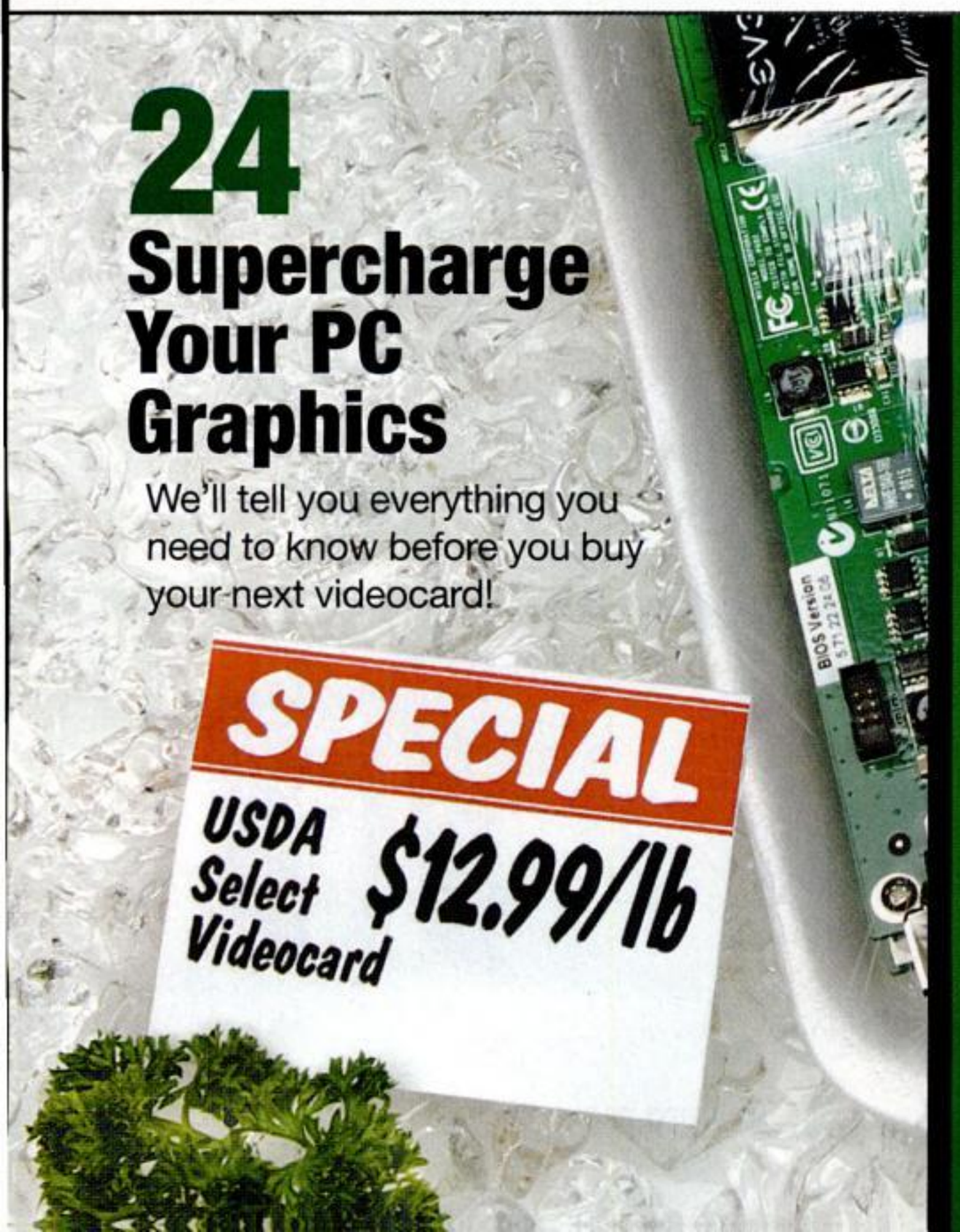
Then I went to test the procedure on a couple of popular web hosts and found, much to my dismay, that the Bittorrent-specific parts of *BM* only worked on my home-based Apache server. Needless to say, it took a ton more time with Google to discover that the problem was with one Apache module, but once I figured that out, it was a simple matter of finding a host that would allow me to disable the module, and I was back in business.

The upshot is simple. If my computing expectations were lower, I wouldn't encounter these pitfalls. But being prepared to suffer (and surmount) the occasional minor inconvenience is an integral part of the power-user experience that I wouldn't trade for anything. If I air-cooled my rig, I'd already be up and running with Vista. If I was less concerned with video quality than ease of use, I never would've discovered *Broadcast Machine,* and you'd be reading another boring *YouTube* how-to.

But that's not how we roll at *Maximum PC.*

Will Smith

Features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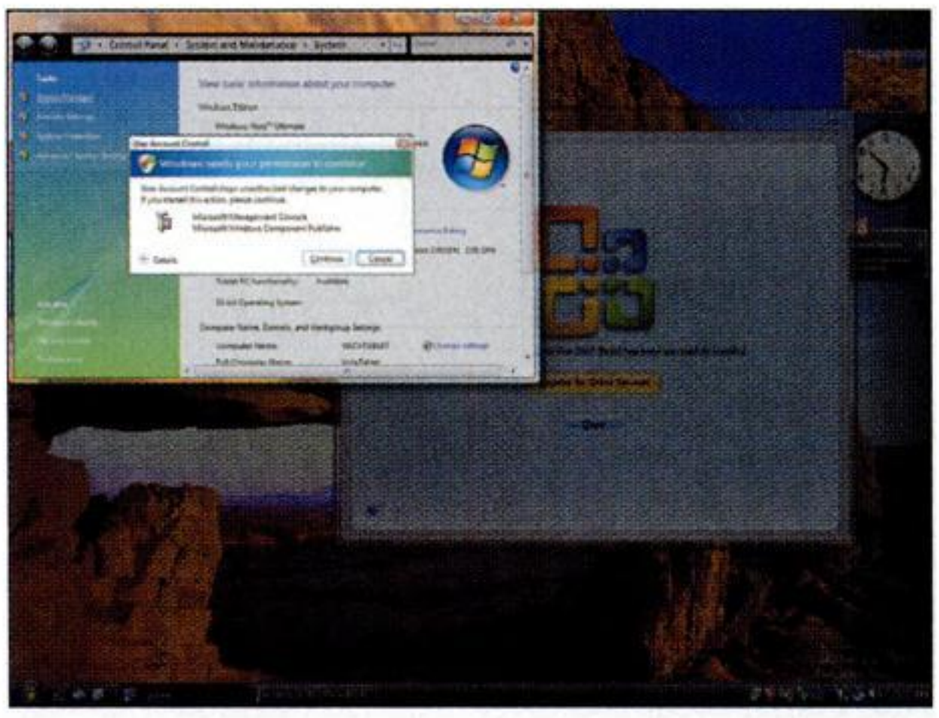
What's up with Windows Vista?

The latest beta of Microsoft's next OS shows signs of improvement, and adds significant new functionality to security, network connectivity, and mobile computers

The new Mobility Center puts all the features you're likely to need—wireless, power, and even display management—in one convenient location in the Control Panel.

We were pretty underwhelmed with the last beta of Windows Vista that we tested: It was slow, unstable, and whole swaths of functionality just didn't work. After spending some quality time with the Beta 2 release, we can say that things are improving. Vista's still not perfect, and it's definitely a long way from release, but it's getting better. Beta 2 adds much more functionality, and feels much closer to release. Here are a few of the most important features that have been added.



Whenever you need to perform a task that requires admin privileges, the screen will darken, and you'll see a prompt like this one over the window that's requesting privileges.

SECURE DESKTOP

A critical feature of Vista is the totally revamped permissions system, which should allow users to run their PC as a limited user. Whenever you do something that requires administrator rights, Vista prompts you before it boosts the applications access level. However, in earlier builds, this feature was flawed—it harassed users constantly, with multiple prompts to complete the same task. With Beta 2, the number of prompts has been drastically reduced, and Microsoft has added a new feature to further reduce confusion over the prompts: Secure Desktop tints the contents of your screen dark gray, then centers the prompt over the application that needs the increased permissions.

MOBILITY CENTER

One of our favorite new additions is the Mobility Center, which puts all the features you'll need when using your laptop in one handy spot. The Mobility Center lets you adjust the power profile settings, wireless settings, volume control, display brightness, display orientation, and even presentation settings.

NETWORK CENTER

In Beta 2, the Network Center is much closer to final. In addition to the network map, which we touched on in our June Vista preview, the Beta 2 version of the Network Center has a much-improved network troubleshooter. We simulated several typical networking problems, including a missing DHCP server, a broadband outage, and a changed Wi-Fi password. The networking troubleshooter managed to correctly identify the problems, and put us on the path to fixing them.

Additionally, there are different profiles for public networks—like your coffee shop's Wi-Fi—and private networks, such as your home or office LAN. When you connect to a new network, Vista asks whether the network is public or private, then changes your firewall profile for that network. On public networks, your firewall will be enabled, on private ones, it will operate in a less restrictive mode.

CLIENT-TO-CLIENT SEARCH

Fast searching on your desktop isn't such a big deal—you can do that right now on XP with any number of free utilities. However, Vista's integrated search will not only allow you to search your own drive, it will also allow you to search other shared drives on your network—as long as the machines run Vista or Windows Longhorn Server.

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Intel Shows off Core 2 Extreme Part

Extreme part looks poised to retake speed crown from AMD

Intel has released some deets on its upcoming flagship CPU. Called Core 2 Extreme, its prodigious potential could make it a bummer of a summer for AMD fanboys.

The Core 2 Extreme CPU is expected to clock in at 2.93GHz and operate on a 1066MHz front-side bus. It'll sport double the amount of L2 cache of the mainstream Core 2 Duo part (4MB for Extreme CPUs, compared to 2MB on the standard Core Duo CPU).

With its "extreme" 1066MHz front-side bus and massive L2 cache, C2E looks ready to lay down the smack on AMD's new Athlon 64 FX-62. Intel didn't release model numbers or pricing but said the part should be available in volume this summer. The first C2E will run on newer 975X boards, which support the proc's lower voltage.

We'd show you a picture of Intel's new CPU, but then we'd have to kill you.

DisplayPort Standard Ratified

The unified digital connector for PCs and home theater equipment, dubbed DisplayPort, has finally been ratified by the Video Electronics Standards Association (VESA). The connector market is currently a mess, with VGA, HDMI, component, and DVI all being offered. DisplayPort will be a single, open-source, unified connector for LCDs, CRTs, plasma TVs, and such.

Manufacturers such as HP, Dell, nVidia, ATI, Philips, Samsung, and others are already jumping on board and have announced support for the new standard. DisplayPort will be able to transmit both high-definition video and multichannel audio between different display devices such as projectors, TVs, and LCD displays. VESA commented that DisplayPort will allow next-generation displays to "feature higher color depths, refresh rates, and display resolutions." The big unknown with DisplayPort is what level of copy protection it will employ. VESA has only stated that it will be "optional and robust."

Back in Black

Black, it seems, is the new silver. Both Cooler Master and Antec have launched all-black versions of their most popular cases

The Antec P180B (left) runs $170, and the Cooler Master CMStacker 830 (right) will set you back $260.

TOM HALFHILL

AMD vs. Intel: Different to the Core

If the CPU war were a football game, AMD would be playing ball control while Intel is gambling on a big-play. If it were basketball, AMD would be applying a full-court press to stall Intel's fast break. This is all just another way of saying that AMD and Intel are following different strategies to develop their x86 processors into champions.

Intel is the former champ that's losing games, so it's switching to a more aggressive strategy. In addition to introducing its new Core microarchitecture this year, Intel says it will henceforth roll out a new x86 microarchitecture every two years. That's a doubling of the rate Intel used to introduce significantly new microarchitectures. (A microarchitecture is a specific implementation of a CPU architecture—a core design that distinguishes different processors sharing a common architecture.)

Of course, it remains to be seen how truly significant Intel's biennial core revamp strategy will be. But it wouldn't surprise me if the revamps are genuine advances. Intel has multiple design teams working in parallel, and I suspect that the engineers will have more leeway to experiment with different ideas than Intel's infamously regimented corporate culture used to encourage. That's because a design team in Israel recently saved Intel from total humiliation by AMD.

While Intel's U.S. designers were melting transistors in their futile pursuit of a 4.0GHz Pentium 4, the Israelis created the cooler-running Banias core for mobile processors. When the Pentium 4's NetBurst microarchitecture flamed out, Intel was forced to adapt Banias and its successors for its desktops and even servers. Banias was so impressive that Intel relocated the leader of the Israeli design team to Silicon Valley to work his magic on the home front.

While Intel is shaking things up, AMD may be turning more conservative. We now know that AMD's next-generation microarchitecture won't deliver the big performance boost some were hoping for. Of course, AMD doesn't need an extreme makeover right now—incremental improvements are sufficient. AMD says it's saving its really big play for the following generation, due in another year or two. But AMD's recent withdrawal of future roadmaps is worrisome. Does AMD really have a big play? If so, it better be more than just a Hail Mary pass.

Tom Halfhill was formerly a senior editor for Byte magazine and is now an analyst for Microprocessor Report.

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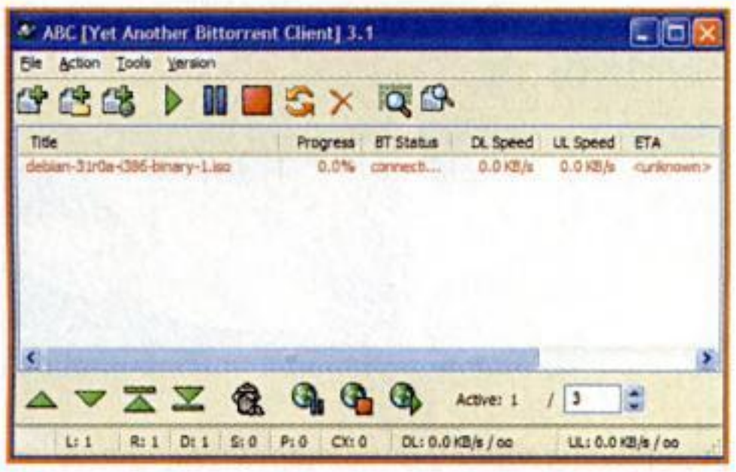

Warner Bros. will begin distributing DRM-bound movies via Bittorrent this summer.

Warner Bros. Embraces Bittorent

In a sure sign that the apocalypse is nigh, Warner Brothers will begin distributing movies via the most popular P2P network for illegal file trading—Bittorrent. Consumers will be able to "rent" DRM-protected movies that play once or twice, or purchase copies to burn to DVD, but the DVD will only be playable on the PC that downloaded the movie.

Microsoft Launches JPEG Alternative

New image format promises better image quality with higher compression

At Microsoft's annual hardware developer conference (WinHEC), the company pulled the wraps off a new lossy compression format for images that it says is better than the ubiquitous JPEG. Dubbed Windows Media Photo, Microsoft claims the new format will offer better image quality than JPEG, at higher compression ratios. Microsoft demoed the new format, comparing a JPEG with 24x compression to its own format, also at 24x compression. Attendees claimed the Microsoft image contained more detail.

Of course, the lossless PNG format has been around for years, though it's never been widely adopted. However, with Microsoft's marketing muscle, you might be browsing an online gallery of WMPs sometime soon.

Vista will include support for Microsoft's new image format: Windows Media Photo.

Seagate Goes Perpendicular

This month's arrival of the world's first desktop hard drive to use perpendicular recording—Seagate's 750GB 7200.10 drive—is a surprising development in the storage world. Though we've known about perpendicular recording for some time now, and manufacturers have talked in vague terms about when the technology would ship, we didn't expect to see it in more than a few notebook drives this year, and not on desktop hardware until 2007. Now the big question is: Will Seagate's bold entry into the perpendicular fray cause the other hard drive manufacturers follow suit?

It would make sense, especially given the long-running capacity war between Seagate and arch-rival Hitachi. Now that Seagate is shipping perpendicular drives, we expect the competition to move to perpendicular as well, pronto. So far, we've heard no such announcements. Could this mean the beginning of a new era of Seagate domination?

We asked Hitachi what its plans are regarding perpendicular recording, and received the following response, "Our strategy is to deploy perpendicular magnetic recording (PMR) first on the small formfactor products—1.8-inch and 2.5-inch—and then move the technology across our 3.5-inch and enterprise products." Hitachi also added, "We expect by the end of 2007, the majority of our product shipments will be on PMR."

Western Digital was equally noncommittal, saying only, "WD will implement PMR in calendar year 2006." WD would not say whether PMR would be implemented in desktop or notebook drives.

FUNSIZENEWS

DELL SELLS AMD SERVERS

After 20-plus years of selling nothing but Intel processors in its workstations, desktops, and laptops, Dell has finally broken free from Intel's shackles and announced it will begin selling AMD-powered servers by the end of 2006. The announcement rocked the IT Industry, and sent Intel's stock tumbling to a three-year low. The deal will allow AMD to make major inroads into the lucrative server market. Could AMD-based desktops be far behind?

APPLE AND CREATIVE SUE EACH OTHER

The battle for the future of the handheld music player just got ugly, with Creative Labs suing Apple for patent infringement, and Apple suing Creative right back for the same reason. Creative is claiming that the interface for the iPod and the iPod Nano infringe on Creative patents. Apple claims Creative is infringing on four of its patents. Creative is seeking to block imports of the iPod, which would effectively prevent any iPods from being sold in the U.S.

NET NEUTRALITY UPHELD

The U.S. House Judiciary Committee has approved a bill upholding Net Neutrality, which will prevent ISPs from creating tiered services that prioritize data depending on how much money one is paying. The largest network providers are promoting the concept, but major bandwidth hogs like Microsoft and Google are dead-set against it. The bill must be approved by the full Senate and House before it becomes law.

GOOGLE RELEASES PICASA FOR LINUX

Penguin-lovers, rejoice! Google has graciously released a Linux version of its *Picasa* image-management software. Google says the Linux version uses Wine internally. At this stage, the software is still beta, and Google encourages users to submit bug reports. Grab it at **http://picasa.google.com/linux/.**

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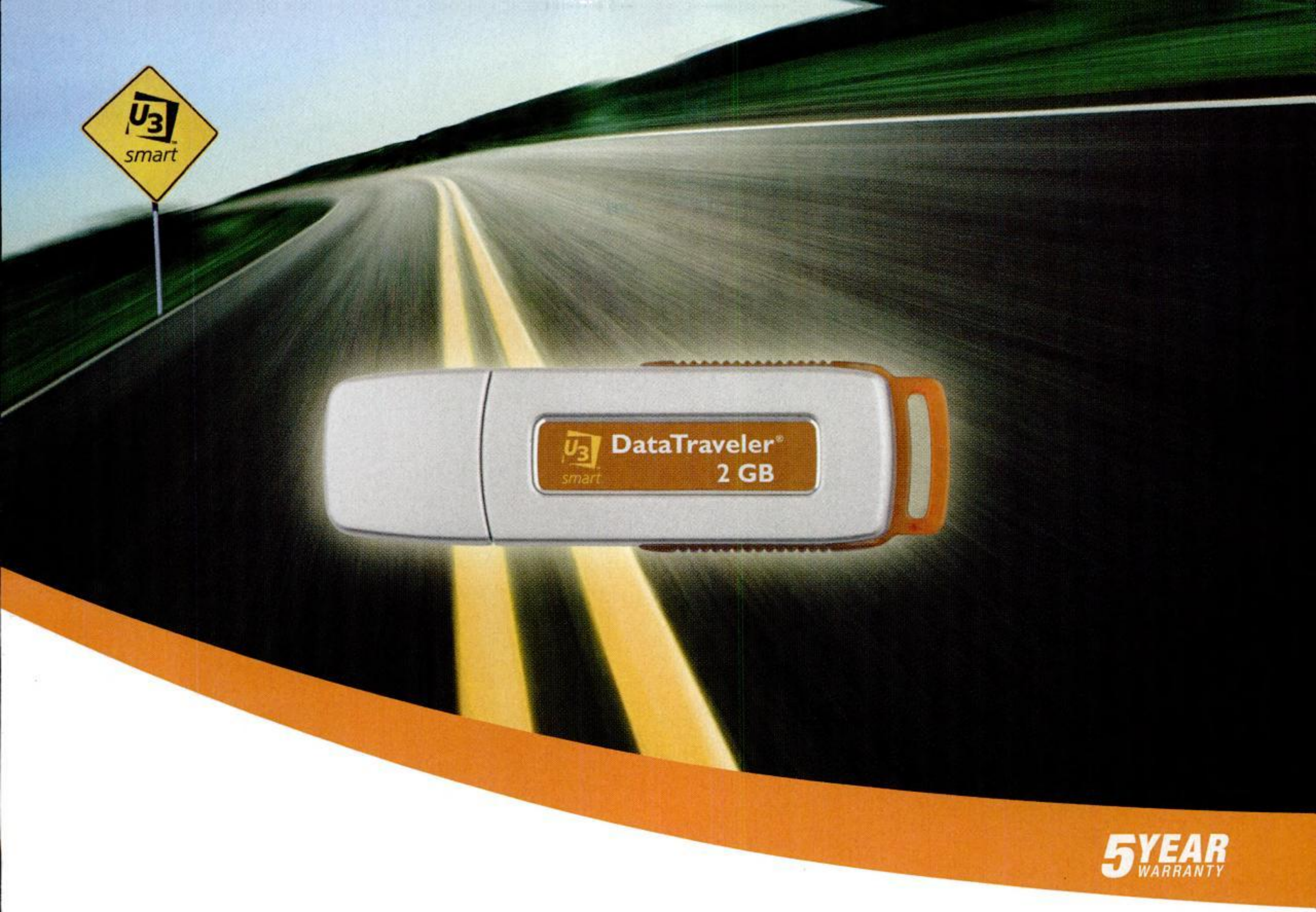

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PC MAGAZINE EDITORS' CHOICE

April 11, 2006
Kingston U3 DataTraveler

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round 2 PORTABILITY

This is a close one, because portable hard drives and their flash memory brethren are both very small and lightweight, but let's take a closer look. Regardless of capacity, the formfactor for a flash memory key never changes. It's always very petite and fits quite easily in a pocket or on a key chain. Even the most miniature portable hard drives (including the diminutive WD Passport Pocket pictured here) are a wee bit larger than the USB keys. They're not huge, mind you, but they're too big for a key chain, relegating them to a pants pocket. While both types of devices are easy to tote around, we have to give this round to the flash memory key.

WINNER: FLASH DRIVE

round 3 DURABILITY

We're not talking about MTBF (mean time between failure) here, but rather how durable and reliable these technologies are for day-to-day use. The difference between the two technologies is that flash memory is solid-state—it has no moving parts. You can chuck a flash key against the wall, toss it in a pocket along with keys and change and what not, and even run it through the washing machine, although we don't recommend that. Hard drives, on the other hand, are mechanical devices, with moving read/write heads and spinning platters. As such, they're more susceptible to damage from movement. Would you ever throw a USB hard drive into your backpack? You could, but you'd be a foolish knave.

WINNER: FLASH DRIVE

round 4 PERFORMANCE

During testing, we found that the performance of high-capacity flash drives is on par with their similar-size hard drive-based counterparts. However, smaller-capacity flash keys are so much faster than even the fastest hard drive that it's embarrassing. For example, in a 3GB write test, the Corsair key took 8:51 (min:sec) to write the file, while the WD drive took 8:47 to write the same file—a difference of just four seconds. We also performed a 300MB write test, where the WD drive was more than a minute faster than the Corsair key (1:23 versus 2:20). By comparison, a 2GB flash key took just 42 seconds to write the same 300MB file—roughly 100 percent faster than the WD drive. And the 2GB key required just 17 seconds to read 200MB, compared with 69 seconds it took the WD drive.

WINNER: FLASH DRIVE

USB FLASH DRIVE
Corsair Flash Voyager 4GB, $100,
www.corsairmemory.com

And the Winner Is...

Clearly, both technologies have a lot going for them and perform similarly to one another in many scenarios. Still, we have to declare the USB flash memory drive the winner of this matchup.

While hard drive-based technology put up a heck of a fight, proving it's come a long way in the last year and a half, flash memory has it beat in a couple of key catagories. In a typical real-world scenario, where a user needs to tote data from home to office, it's a small file, not a 3GB ISO, that's at issue. In such cases, we prefer the speed and portability that flash memory delivers.

We also love the ruggedness of flash drives. We can carry them anywhere, drop and toss them at will, and even send them through the wash without worrying about our data dying a premature death. They are so amazingly durable that we treat them with utter disrespect, yet the *Maximum PC* staff has only managed to destroy four since the first one entered our Lab in 2001.

Sill, the hard drive camp can hold its head high. Portable hard drives are very compelling, offering higher capacities than flash memory drives for the same money. And, for capacities greater than 2GB, flash loses its speed advantage, making the hard drive a more attractive proposition. If storage space is your biggest concern, we have no trouble recommending a hard drive-based drive, but for every other scenario, flash memory-based drives come out on top. MPC

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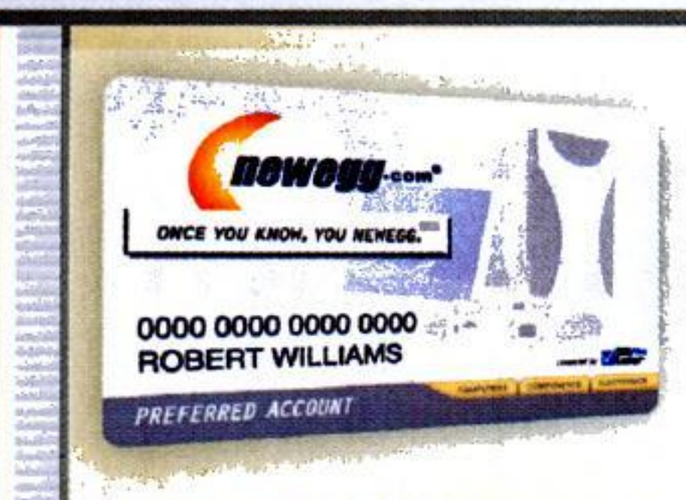

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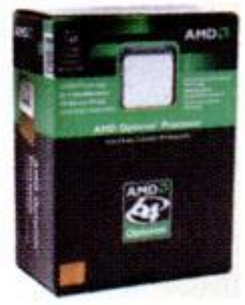

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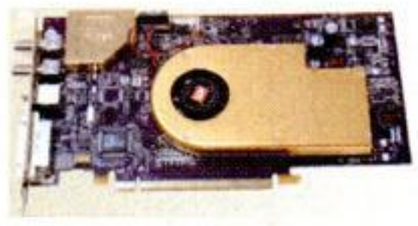

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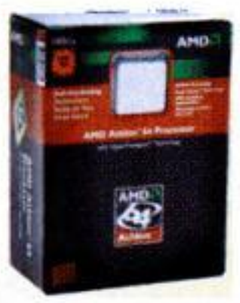

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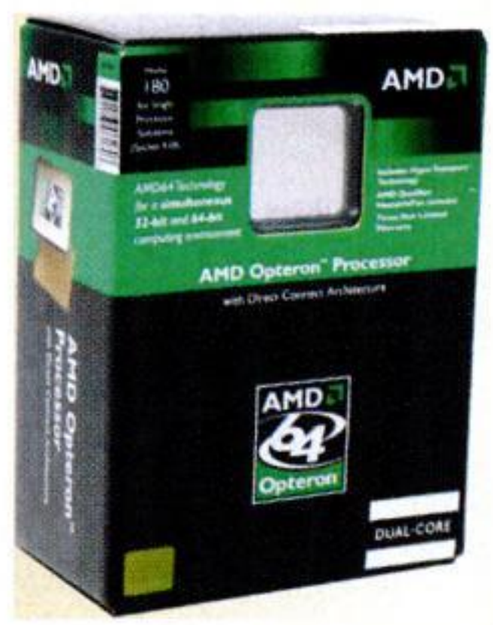

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JOURNEY TO THE D-I-Y SIDE...

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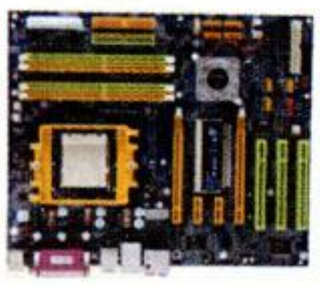

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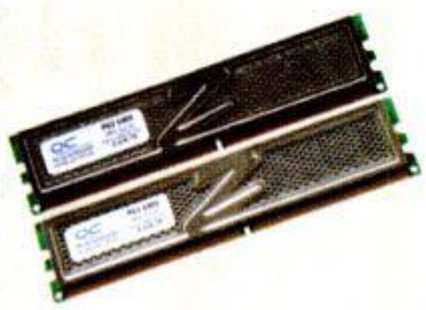

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Lunchbox, Watchdog of the month

Our consumer advocate investigates...

✓Sony CCD Sensors ✓SunRocket VOIP ✓Seagate Warranty ✓OneClickDigital.com

GREEN SENSORS SETTLED

Well, that was fast. Sony has settled a class-action lawsuit that alleged the company's CCD sensors in its cameras were defective and caused a greenish tint and smearing in the cameras' output. The suit is scheduled to be approved by the court by the time you read this, and Sony will accept claims up until October 2, 2007. Sony denied that the CCD imagers were bad but the breadth and depth of the products affected seems to indicate something was amiss. What cameras are covered? Peep this list of DV cams: CCD-TRV118; CCD-TRV128; CCD-TRV318; CCD-TRV328; DCR-DVD100; DCR-DVD101; DCR-DVD200; DCR-DVD300; DCR-HC20; DCR-HC20 M; DCR-HC30/S; DCR-IP5; DCR-IP55; DCR-PC101; DCR-PC105; DCR-PC120BT; DCR-TRV18; DCR-TRV19; DCR-TRV19M; DCR-TRV22; DCR-TRV240; DCR-TRV25; DCR-TRV250; DCR-TRV260; DCR-TRV27; DCR-TRV33; DCR-TRV340; DCR-TRV38; DCR-TRV39; DCR-TRV460; DCR-TRV50; DCR-TRV740; DCR-TRV840; DCR-TRV950; DCR-VX2000; DCR-VX2100; DSR-250; DSR-250/1; DSR-PD150; DSR-PD170; and DSR-PDX10.

And this list of digital still cameras: DSC-F717; DSC-P10/S; DSC-P2/S; DSC-P31; DSC-P31M; DSC-P32; DSC-P32M; DSC-P51; DSC-P51M; DSC-P52; DSC-P52 M; DSC-P7; DSC-P71; DSC-P71M; DSC-P72; DSC-P72M; DSC-P8/L; DSC-P8/R; DSC-P8/S; DSC-P92; DSC-P92M; DSC-U10/S; DSC-U20/B; DSC-U20/LJ; DSC-U20/S; DSC-U30/H; DSC-U30/LJ; DSC-U30/S; DSC-U60; DSC-V1; MVC-CD250; MVC-CD250 M; MVC-CD400; MVC-CD500; MVC-FD100; MVC-FD100 M; MVC-FD200; and MVC-FD200 M.

The company has agreed to repair, at no charge, the CCDs in the above cameras up until October 2, 2007, and will reimburse consumers who have already paid to fix the problem. More information is available at www.sonystyle.com/ccdsettlement. To see an example of what the problem looks like, visit www.sony.com/ccdservice.

YOU'VE REACHED 912

About a month ago I received a note that e911 service didn't exist for my new SunRocket VOIP service. After the first email, I heard nothing further.

Today, in the midst of my work day, I received a message that because e911 service isn't available for the number that SunRocket had assigned me, based on where I live, it simply disconnected the entire service. I received absolutely no warning about the disconnect; VOIP simply doesn't work now. Voice mail in the account and the web portal for the account have also been nuked.

We have POTS service, so we weren't crippled, but I had the number on my business cards and my wife used it for her home business. Where was my advance warning or offer of a solution? And what if this had been my only home phone line? My home would be completely without service right now, which would present an even greater danger than just not having 911 service.

Regardless of the federal regulations that are being blamed for the disconnect, I think this is incredibly poor customer service. I want a refund.

— Kevin Derby

The Dog contacted SunRocket for its side of the story. A spokesman told us that the company had worked with Kevin to resolve his problem, once the company realized his service was interrupted.

Although it sounds odd, the spokesman defended the company's actions, saying that SunRocket's policy is to roll out e911 service to all of its customers, as is required by law. Other VOIP providers who are not mandating e911 service are technically breaking the law, he said. And while it sounds like SunRocket is destroying the village to save it, the company wants to be in full compliance with the law and thinks that it's in the best interest of its customers to ensure that they all have emergency service. With that said, the spokesman also acknowledged that SunRocket working on improving the process and making the service interruption shorter. He said the company offers full refunds for consumers who lose service because of the e911 issue—something he assured us Kevin is entitled to.

Sony has agreed to repair alleged bad sensors or reimburse consumers, to settle a class-action suit against the company.

SEAGATE WARRANTY BLUES

I wear a white shirt, black tie, and work for a local big-blue-box store. Recently, we replaced a client's hard drive with a 60GB Seagate notebook drive. She came back in a few months later, and for whatever reason, that drive was going bad. We suggested she register her drive with Seagate and take advantage of her five-year warranty. But Seagate wouldn't let her register the drive. We called Seagate on it, and were told that the company wouldn't register the drive because it was an OEM drive—impossible since it came off our

Got a bone to pick with a vendor? Been spiked by a fly-by-night operation? Sic The Dog on them by writing **watchdog@maximumpc.com.** The Dog promises to answer as many letters as possible, but only has four paws to work with.

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Even Seagate hard drives that are labeled as "OEM" carry the company's five-year warranty, as long as they were purchased in retail packaging from an authorized distributor.

shelf in a retail box. Seagate also claimed that the five-year warranty was only good on retail drives of more than 100GB. Wait, it gets better. We went to get a new drive for our customer, a Seagate 120GB notebook drive. Before opening the pouch, we found an OEM disclaimer. Isn't selling OEM drives as retail drives an illegal practice? Or is it OK because they put the disclaimer on there? Either way, it sucks because the company won't honor the five-year warranty that's plastered on the front of the box.

— Josh Estes

The Dog spoke to a Seagate official who said that despite what the support person said, all current Seagate hard drives sold in retail packaging carry a five-year warranty, regardless of the capacity.

Furthermore, the Seagate official said that even an OEM drive carries five-year warranty if the drive is sold in a retail package. To verify this, the Dog went to Seagate's warranty validation website (http://support.seagate.com/customer/warranty_validation.jsp) and entered the serial number of the drive that Josh refers to in his letter. The website indicated the warranty is valid, but only through May 2007—far short of the five-year warranty period. Was this an OEM drive or truly a retail drive?

Posing as a customer, the Dog called Seagate's warranty support and was told that the drive is indeed covered for five-years if it was purchased at a retail store. The Dog was advised to email an image of the drive's label, as well as a high-res scan of the receipt to custserv@seagate.com, along with an image of any packaging materials that mention a five-year warranty. This information, along with a full name, email address, phone number, and home address will let Seagate update its database to reflect a full five-year warranty. Woof.

NO CLICK

I purchased a gift for Mother's Day from OneClickDigital.com. I should have followed my instincts, which said the deal would go bad. I did not receive a confirmation, so I called the customer service number several times. Finally, when I reached someone, they were quite rude and unhelpful. What's the story on these guys?

— Armando Couto

The Dog tried to contact OneClickDigital.com of Brooklyn, NY, for comment, but no one responded. Not surprising, as OneClickDigital has a track record of being hard to reach. In the last 12 months, the company has responded to zero complaints made to the Better Business Bureau, which resulted in a thumbs-down rating from the BBB. The BBB notes that OneClickDigital also goes by the names: Best Buy Digital, Circuit Digital, Digicam Returns, Digital Fuze, Digital Support Department, Digitally Discovered, E-Supersale, One Click Digital, Source For Digital, Tristate Digital, and World Net USA, Inc.

How does OneClickDigital.com fare at ResellerRatings.com? Poorly. Although the online site gets a good rating for its prices, when it comes to shipping and packaging, customer service, and return and replacement, the company gets dismal marks from most of the 22 reviewers who posted ratings in the last six months. A majority of reviewers reported that the company tried to upsell them on additional parts they didn't want, and when they declined, the store cancelled the original order, saying the low-price item was not in stock—a classic tactic that should set off alarms. This is one online store people should avoid. Woof. MPC

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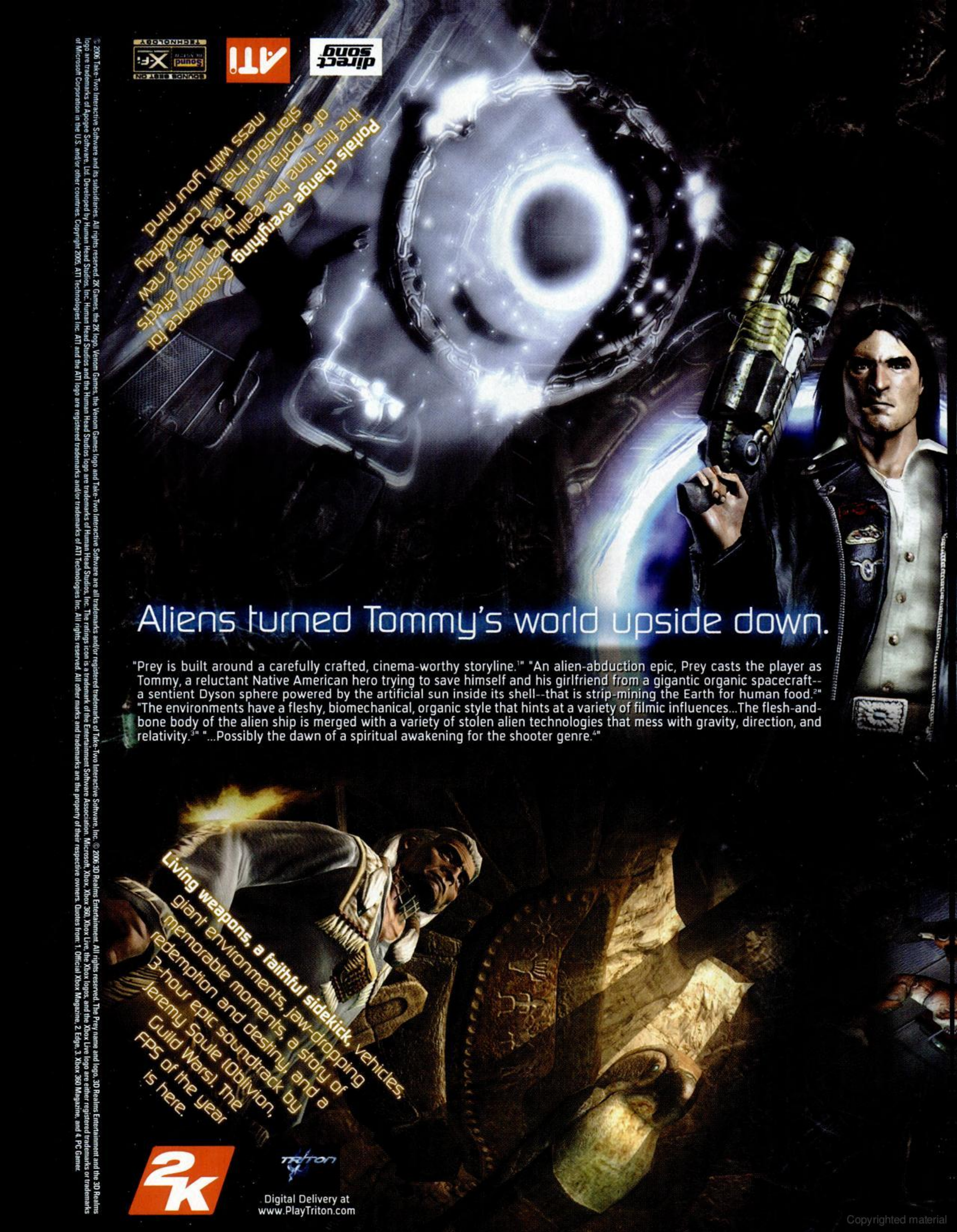
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Aliens turned Tommy's world upside down.
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Living weapons, a faithful sidekick, vehicles, giant environments, jaw-dropping memorable moments, a story of redemption and destiny, and a 3-hour epic soundtrack by Jeremy Soule (Oblivion, Guild Wars). The FPS of the year is here.
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Blood and Gore
Intense Violence
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Imagine a place where gravity isn't always what it used to be. Where you can be controlled, twisted, flipped, and even warp around small planetoids? Imagine walking on walls and ceilings? Can you handle this new challenge?

PREY

Now he's about to return the favor.

"Prey looks like one of the best first-person shooters of the year in both graphics and gameplay." – IGN

"Absolutely incredible to look at, packed with scintillating effects." – Play

"Doom 3™ hiked the bar. Prey may transform the bar altogether." – 1UP

Multiple gameplay innovations from the developer that brought you Bullet Time, including Deathwalk (dying is no longer annoying...it's fun!) & Spiritwalk (leave your body to explore, ambush, and solve mind blowing puzzles).

3D REALMS

humanhead

ENOM GAMES

FRESH MEAT

GET YOUR VID

Sink your teeth into our juicy reviews of the nine newest graphic delicacies from ATI and nVidia —MICHAEL BROWN

ATI and nVidia continue to outdo each other in their competition to build the perfect videocard beast. We've rustled up nine of their latest for thorough inspection and rigorous benchmarking.

We divided the cards into four price categories and measured both single- and dual-card performance. We've also taken an in-depth look at nVidia's dual-GPU/single-slot GeForce 7950 GX2. (We're not measuring quad-SLI performance, however, because nVidia doesn't currently support quad as a DIY product.)

Benchmark numbers aren't very meaningful without the context to understand the technology that generated them, so we've also put together a videocard primer that will help you understand how and why one card manages to outperform—or underperform, as the case may be—its competition. If you want to get straight to business, you can turn to the reviews starting on page 32 or the benchmarks on page 37. Dig in!

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Videocard Terminology

Don't be confused by the features, specs, acronyms, and components associated with modern videocards. We've prepared this handy guide to help you wade through the techno-babble. Take it with you when you shop; it'll help you separate the nutritious chunks of information from the indigestible marketing offal

ALTERNATE-FRAME RENDERING

A technique in which two or more GPUs installed in the same PC—nVidia's SLI or ATI's CrossFire, for example—divide the rendering workload by processing alternating frames: In a dual-GPU system, one chip processes the even-numbered frames while the other processes the odd-numbered frames. Alternate-frame rendering is favored over other multi-GPU rendering processes, such as split-frame or scissor rendering, because it delivers better performance scaling (a higher-percentage increase in frame rate with each additional GPU).

If you're interested in editing your old VHS tapes, look for a videocard that features analog-video *input* (the circular black port, above) as well as output (VIVO, or Video-In, Video-Out).

ANISOTROPIC FILTERING

When a three-dimensional surface stretches from behind the camera's perspective off toward the horizon, the texture applied to it will look fuzzy and out of proportion the farther into the distance the surface extends. A classic example is the text that sets up the story to each of the *Star Wars* films: as the lines recede into space, they become more difficult to read. Bilinear and trilinear filters don't work well in this situation because they're isotropic, meaning they use square filtering patterns with equal values along each of their axes. Anisotropic filters have filtering patterns with different values along their axes—think rectangles, trapezoids, or parallelograms.

When you increase the level of anisotropic filtering that a GPU uses, you increase the number of texture samples (known as "taps") that the GPU applies to each pixel: a 4x aniso setting will use 32 texture samples per pixel, 8x aniso will use 64 samples per pixel, and so on. A higher anistropic filtering setting will provide better image quality, at the expense of performance.

ASPECT RATIO

The width of an image in relation to its height. Standard-definition televisions and typical computer monitors exhibit a 4:3 aspect ratio (four units wide by three units high), while high-definition televisions and widescreen computer monitors exhibit a 16:9 aspect ratio. All the videocards in this roundup support both aspect ratios, and beginning with this story, *Maximum PC* is switching its videocard testing procedures from a screen resolution based on a 4:3 aspect ratio (1600x1200) to one based on a 16:9 aspect ratio (1920x1200).

DIE SIZE

Integrated circuits, including GPUs, are assembled en masse atop silicon wafers. Die size, measured in square millimeters, describes a single GPU's footprint on the wafer. The smaller the die, the more ICs that can fit on a single wafer; assuming good yields from each wafer (meaning a high ratio of operational to defective chips), a GPU with a small die size will have a lower per-unit cost. Generally speaking, a chip with a smaller die size will also draw less power, generate less heat, and require less cooling. This helps explain why ATI's X1900 XTX, which has a die size of 315 square millimeters, runs so much warmer than nVidia's 7900 GTX, which has a die size of just 196 square millimeters.

DVI-I; DUAL-LINK DVI-I

DVI-I connectors output video to a digital flat-panel display or, with a VGA adapter, to an analog CRT display. Dual-Link DVI-I connectors carry a second data pipe to provide more bandwidth for high-resolution displays (e.g., 2560x1600). A card equipped with dual dual-link DVI-I simply has two dual-link DVI-I connectors. The GeForce 7600 GT has one dual-link and one single-link DVI-I connector; all the other cards in this roundup feature dual dual-link connectors.

HDTV SUPPORT

Although none of the cards in this roundup is equipped with a TV tuner, each one is capable of outputting high-definition analog video to a HDTV via component, composite, or S-Video at up to 1080i resolution. ATI and nVidia cards both rely on proprietary break-out cables to deliver component video, but newer nVidia-powered cards use a cleverly designed connector on the mounting bracket that can accommodate either a proprietary cable for analog component video or a standard S-Video cable. For more information on HDTV support, refer to the sidebars titled "The HDCP Boondoggle" and "H.264 Acceleration."

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HIGH DYNAMIC-RANGE LIGHTING

When you walk out of a dark room into the daylight, your eyes are temporarily overwhelmed by the brightness, but after a moment they adjust to the sun's light. High dynamic-range lighting attempts to simulate this effect in games.

Because even the best monitors have many fewer steps between bright white and dark black than your eyes can sense, your videocard needs to perform some trickery to get HDR lighting to work. HDR lighting calculates a very wide range of exposures, then shifts them as necessary to preserve detail when there are significant differences in contrast within a scene. In the absence of HDR, light areas tend to blow out to white, dark areas tend to be clipped to black, and the entire scene looks dull. With HDR enabled, scenes look more vibrant and realistic because the light behaves and impacts the scene more like it would in the real world.

When playing a game that supports both HDR and antialiasing, owners of videocards powered by nVidia GPUs must choose one feature or the other; nVidia's chips aren't capable of doing both at the same time. Owners of videocards built around ATI GPUs *can* enable both features at the same time, but the performance hit is severe.

OVERCLOCK

Chip manufacturers specify the core clock speeds at which they guarantee their parts will reliably operate. These manufacturer specifications are usually conservative, and the parts can often operate reliably at higher speeds. Because neither ATI nor nVidia "lock" their GPU speeds, it's possible for add-in-board manufacturers, or even the end user, to boost a card's memory and GPU clocks to gain additional performance.

ATI makes this process easy and relatively foolproof with its *ATI Overdrive* utility, which is part of the company's *Catalyst* software. ATI doesn't guarantee that using this utility to overclock your GPU and video memory won't make your system unstable, but overclocking with this software won't impact your warranty. nVidia's Coolbits registry hack adds a "Clock Frequency Settings" menu item to your Display Properties window. This will likewise enable you to overclock your nVidia GPU and video memory—aggressively, if you choose to—but using Coolbits will expressly void your warranty.

PIXEL PIPELINE

Everything you see rendered on your monitor is constructed from pixels (the word itself is a contraction of the phrase "picture elements"). Before the pixels are sent to the display, they travel down an assembly line—the pixel pipeline—so the GPU can execute a series of instructions to apply textures and transformations (transparency, deformation, reflections, lighting, and so on) to them. The GPUs covered here have between 12 and 24 pixel pipelines operating in parallel.

There was a time when having a higher number of pixel pipelines automatically translated into higher performance overall, but that changed with the ATI's introduction of the X1900-series of GPUs. The X1900 has only 16 pixel pipelines, but each of these pipes can feed three pixel-shader units: 48 in all. This 3:1 ratio of pixel-shader units to pixel pipelines enables the X1900-series to outperform nVidia's GeForce 7900 GT and 7900 GTX in benchmarks that stress pixel-shader performance even though these nVidia GPUs are equipped with 24 pixel pipelines.

PIXEL SHADER UNIT

This is the GPU component that executes the instructions to apply textures and transformations to each pixel as it moves down the pixel pipeline. Pixel shaders are used to make smooth objects more rough and realistic, as well as to create reflections.

PROCESS TECHNOLOGY

This describes the physical distance separating each transistor on an integrated

The HDCP DRM BOONDOGGLE

There's a chance your videocard will be useless for playing Hollywood movies on Blu-ray and HD-DVD media. That's because movies delivered in these formats are being encrypted using HDCP (High-bandwidth Digital Content Protection) and AACS (Advanced Access Content System). HDCP will also be a crucial element of Microsoft's "output content protection management" for Vista.

Any videocard that doesn't support HDCP potentially won't play high-definition content from the next-gen formats; and of the nine videocards reviewed here, only EVGA's GeForce 7950 GX2 offers HDCP support. (This should be true of any card based on nVidia's GeForce 7950 GX2.)

To make matters worse, even if your videocard *does* support HDCP, you still might be unable to play encrypted Blu-ray or HD-DVD content—at least not in full resolution. AACS is used to encrypt the video stored on the disc; HDCP encrypts the video as it's streamed from the player to the monitor. Both technologies allow content providers to set a flag, called the Image Constraint Token (ICT), that will output high-resolution signals (720p, 1080i, or 1080p) only via a digital connection with HDCP support at *both* ends. If such an encrypted signal is sent out a videocard that supports HDCP to a monitor that does not (or if it's output over an analog connection, such as component video or a VGA connector), the video *can* be down-converted to 540p resolution. We emphasize "can" because this decision is left to the content provider; Sony, for one, has so far publicly stated that it doesn't intend to do this with its high-def content.

Rumor has it, however, that Sony, the rest of the Hollywood studios, and the consumer-electronics industry have struck a handshake deal to delay implementing ICT until the year 2010. If you're an optimist, you'll see this development—assuming it's true—as evidence of the power of the marketplace: industry caving to the unbending will of the consumer. If you're a realist, you'll perceive this as a shrewd tactic to protect the launch of Blu-ray and HD-DVD. Recent events line up with the realist's view.

Neither Microsoft's Xbox 360 nor the low-end version of Sony's PS3 are equipped with the DVI or HDMI connectors that HDCP requires. This is puzzling considering that the PS3 will be outfitted with a Blu-ray drive and Microsoft plans to offer an add-on HD-DVD drive for the Xbox 360. But if ICT won't be a factor for five or six years, Sony and Microsoft can save a few bucks by not implementing the technology today.

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H.264 Acceleration

H.264 is a variant of the MPEG-4 digital video codec that's capable of achieving very high data-compression. The standard was developed to provide high-quality video at a bit rate low enough to be streamed not only from a hard drive or optical disc, but also a network (e.g., the Internet or a LAN) and multimedia telephone services.

H.264 can be used to encode either low- or high-resolution video, and it has been adopted for use in both of the new high-definition disc formats: Blu-ray and HD-DVD. You'll also find flavors of H.264 in Apple's QuickTime 7, Sony's PSP handheld video player, and in the satellite TV services Dish Network and DirecTV.

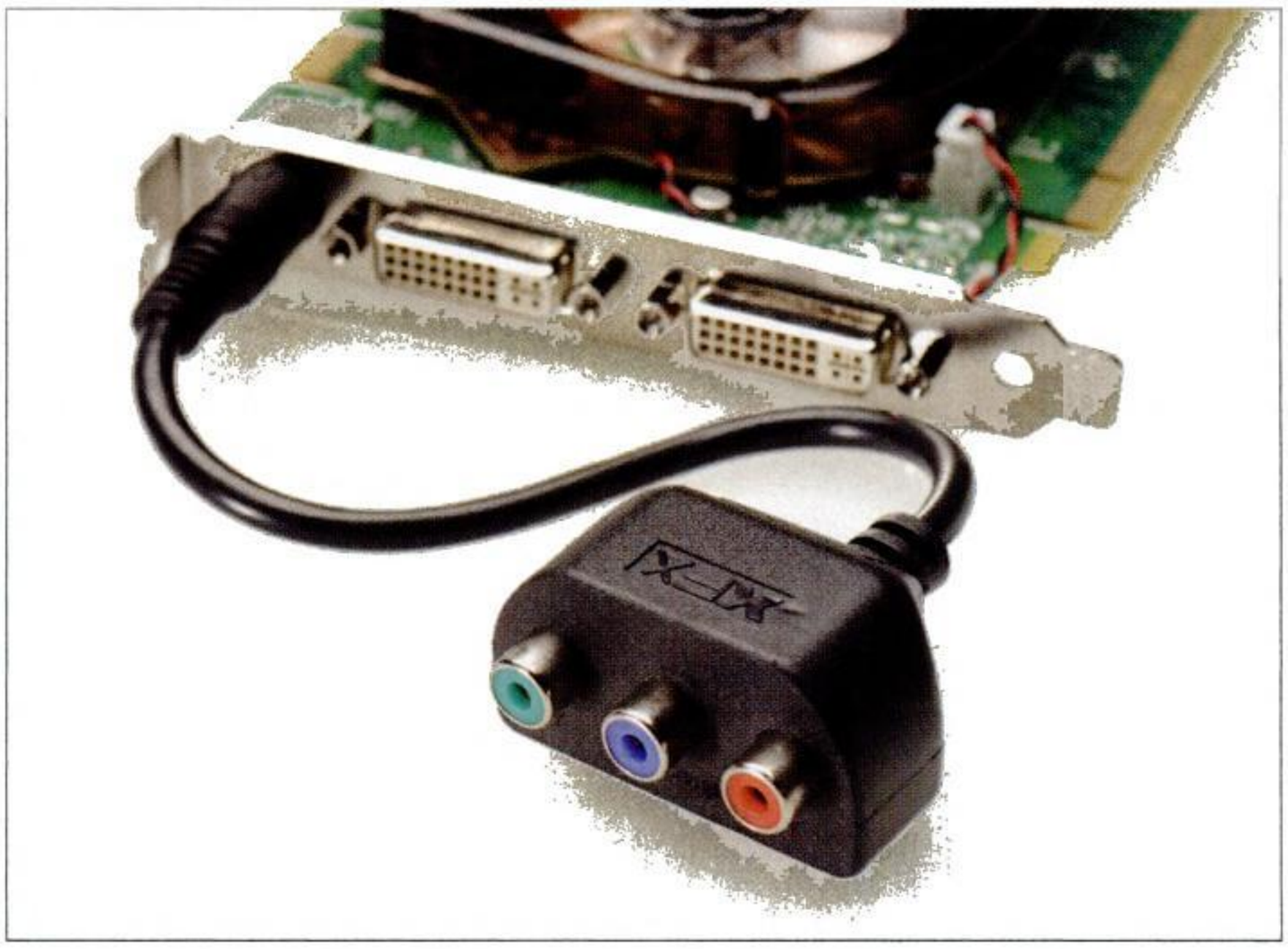
Block motion compensation is one of a video codec's most important tools. It describes the difference between consecutive frames of video, so the information that's present in multiple frames can be encoded just once and the redundant data in subsequent frames is discarded. MPEG-2 partitions each frame into 16x16-pixel blocks, which can leave blocky artifacts when the video is decoded; such artifacts are particularly noticeable in fast-action sequences.

With the variable block-size motion compensation that H.264 supports, the encoder can dynamically vary the size of these blocks from as large as 16x16 pixels (to encode coarse detail) to as small as 4x4 pixels (to encode fine detail). This ability to encode different-size blocks very nearly eliminates blocky artifacts.

H.264 decoding requires considerably more processor power than MPEG-2 and MPEG-4. It can consume 80 to 100 percent of even a very fast CPU's cycles. ATI supports hardware-accelerated H.264 encoding with the Avivo technology in its X1000-series GPUs, but you'll need one of the company's high-end processors—something in the Radeon X1800 or X1900 lines—to decode H.264 at 1080p. The X1600 maxes out at 720p and the low-end X1300 can do only 480p.

Each of the GPUs in nVidia's GeForce 6- and 7-series features a programmable video processor within its core. This enabled nVidia to add hardware-accelerated H.264 decoding to all the processors in both these families, with GPUs as old as the GeForce 6600 GT capable of delivering H.264 at 1080p resolution.

Whether you choose ATI or nVidia videocards, you'll need third-party H.264 decoding software.



A component-video break-out cable such as this delivers analog video to your TV.

circuit. As chip-manufacturing equipment becomes more precise, it becomes possible to reduce this distance—a phenomenon known as "process shrink." The smaller the process technology, the more transistors that can be squeezed into the same space.

ATI's and nVidia's current high-end GPUs are manufactured using 90nm process technology, which means each transistor is just 90 nanometers away from the other. The next-generation GPUs from both companies will likely be manufactured using 65nm process technology.

PROFILES

Profiles are a collection of videocard driver presets (antialiasing and anisotropic filtering values, for instance; or in the case of a dual-GPU rig, the type of frame rendering used) for a specific game or software application. ATI and nVidia both use profiles to help the end user get the best experience with a given app. In both cases, the manufacturer provides some default profiles, but you can edit these values or create entirely new profiles if you want to increase performance in your multiplayer games, while keeping image quality high in your single-player games.

PROGRAMMABLE SHADERS

Programmable shaders are small, usually simple programs that can be run by special graphics hardware in the pixel pipeline. They can modify either pixels (see pixel shader unit) or vertices (see vertex shader unit). Programmable shaders allow developers to customize the way they use your graphics hardware, instead of limiting themselves to functionality hard-wired into the GPU by the manufacturer.

SPLIT-FRAME RENDERING

A multi-GPU rendering technique, used in both ATI CrossFire and nVidia SLI systems, in which a scene is divided into regions that are then assigned to each GPU to process. Also known as scissor-mode rendering.

SUPER-TILING

A multi-GPU rendering technique used in ATI's CrossFire technology. The scene is divided into a series of tiles, checkerboard style, and each GPU is assigned alternating titles to render. A compositing chip on the CrossFire master card combines the two sets of tiles to create a coherent image.

VERTEX SHADER UNIT

This is the GPU module that transforms the color, position, and texture of vertices (the points of a triangle) from the original color space to the display space.

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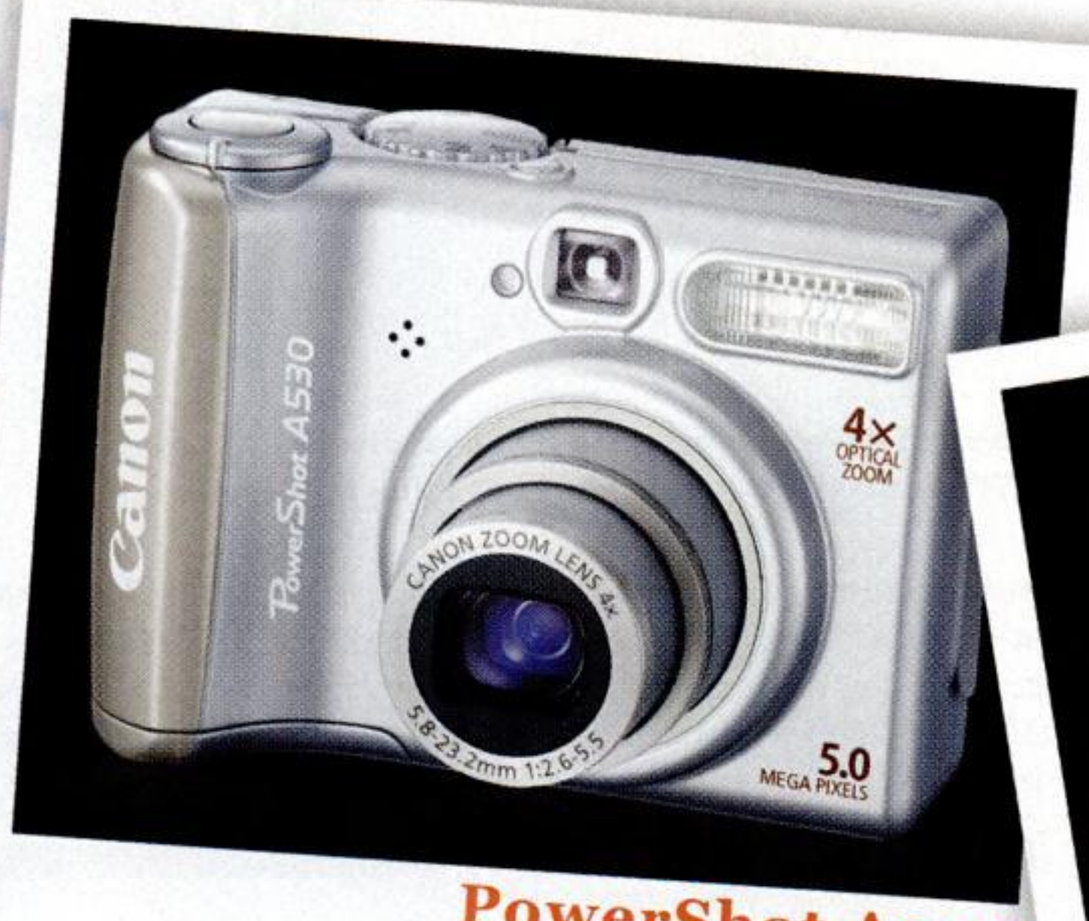

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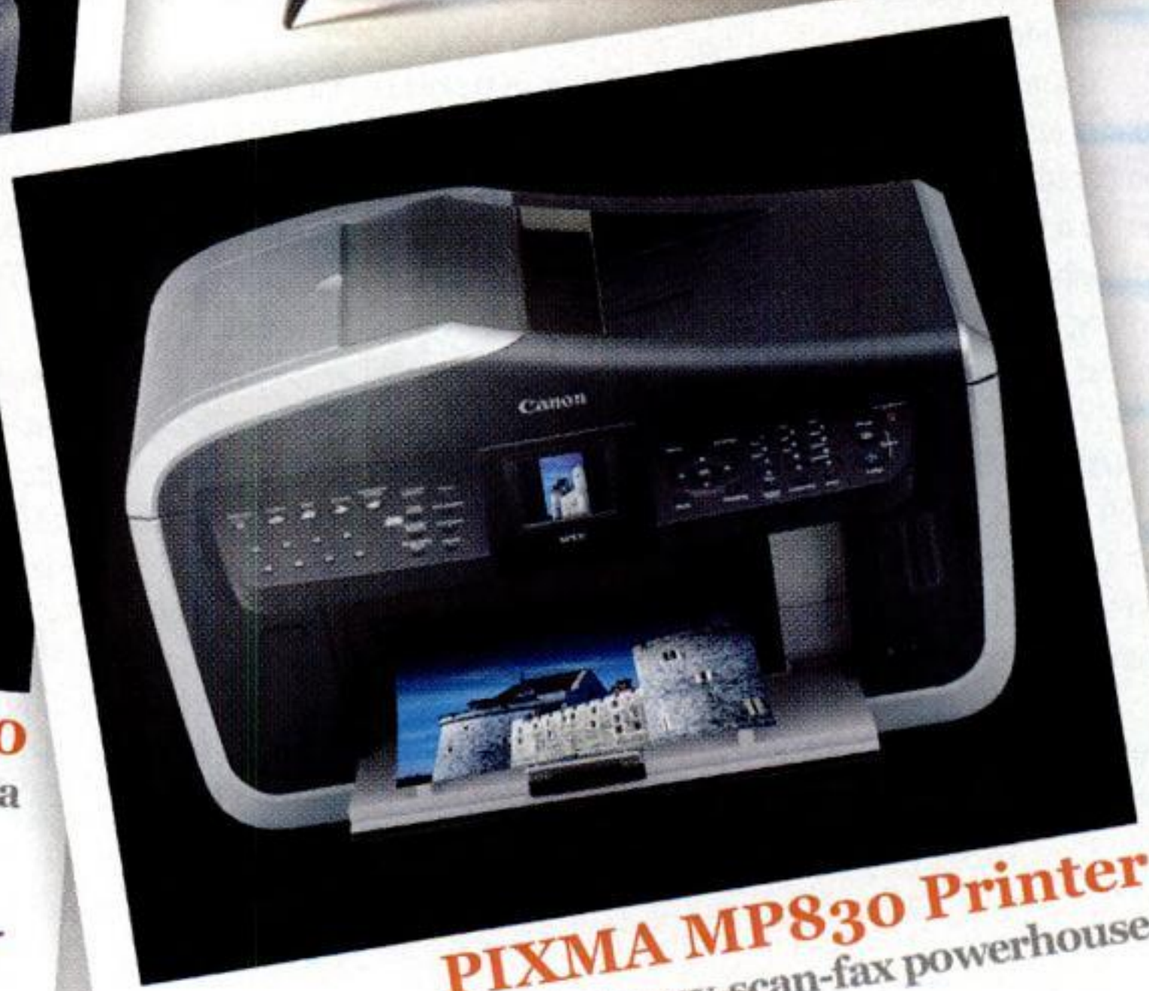

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$200 Select Cuts

You'll be amazed at the graphics horsepower that 200 bucks gets you these days. Neither of these cards is chopped liver

So what if we're comparing nVidia apples to ATI oranges; ATI's X1800 GTO (left) is the best value in this price range.

XFX 7600 GT *FEAR* fanatics looking forward to the *Extraction Point* add-on pack will dig what XFX's über-overclocked GeForce 7600 GT has to offer—as long as they pick up the XXX edition reviewed here. This is also a great budget card for anyone interested in watching video on a standard- or high-definition television monitor.

XFX pushes the 7600 GT's boundaries by overclocking the GPU to 590MHz (compared to 560MHz stock), and its 256MB of memory to 800MHz (compared to 700MHz stock). The chip's overall performance is limited, however, by a narrow 128-bit memory interface and the presence of a mere five vertex-shader units. ATI's superiority in this class crosses over to dual-GPU territory, too—with one important exception: You must disable CrossFire to connect an ATI card to a TV monitor.

CONNECT3D X1800 GTO At press time, the average street price for an X1800 GTO card was about $20 higher than the 7600 GT, but mail-in rebates from Connect3D and most of its competitors made up the difference, and then some. We predict that prices for this class of card will head even lower when nVidia's super-high-end 7950 GX2 hits the market.

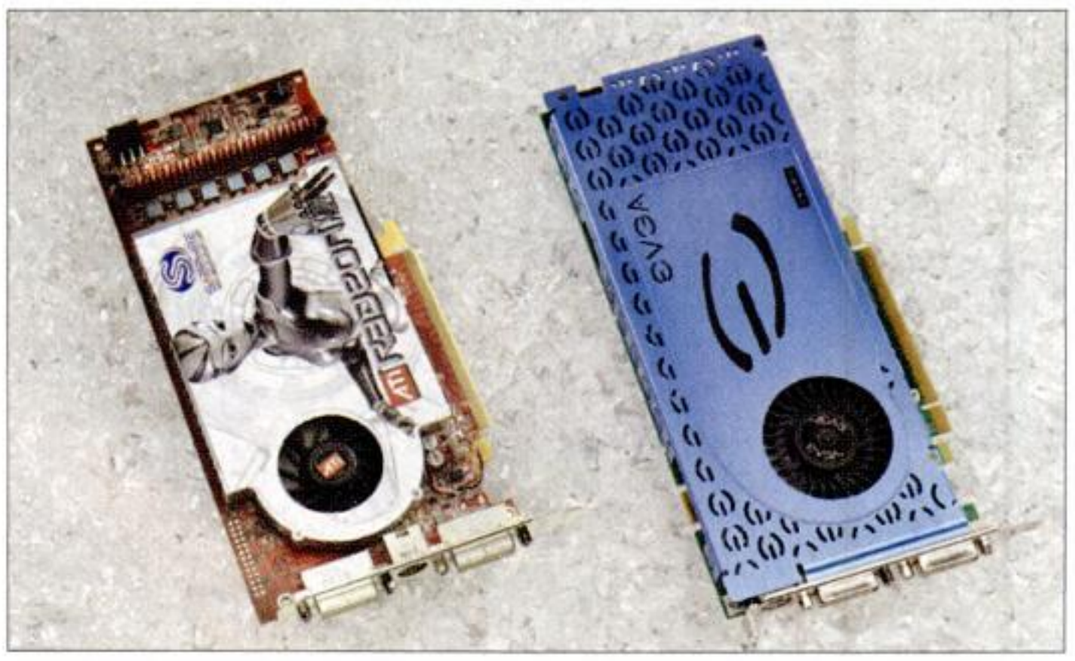
Although the X1800 GTO and the 7600 GT are both outfitted with 12 pixel-shader units and 256MB of GDDR3 memory, the former card has three more vertex shaders and twice the memory bandwidth. This enabled it to sail past nVidia's offering in all but two of our benchmark tests. ATI's Avivo technology notwithstanding, we were disappointed with the X1800 GTO's video performance: nVidia's latest drivers propel its video quality far beyond ATI's. ATI also needs to get its CrossFire act together when it comes to video, but at least you don't need that dumbass dongle with the X1800 GTO.

BEST $200 CARD

Do whatever it takes to scrounge the extra few bucks you'll need to buy an X1800 GTO. It's a much better value than the less-expensive 7600 GT.

$350 Choice Steaks

The menu gets more interesting when you have a little more lettuce to throw around



ATI disabled a dozen pixel-shader units in its top-drawer GPU to create the less-expensive Radeon X1900 GT (left).

EVGA GEFORCE 7800 GTX At this price point, nVidia's GPU climbs all over ATI's brand-new X1900 GT on most benchmarks, with the notable exception of Bethesda Softworks' HDR-heavy *Oblivion*. If you're a fan of *Quake* (or any of the other games that harness the *Doom3* engine's power), the 7800 GTX is the clear-cut winner. It also scales better in dual-card mode.

Although both GPUs feature 256-bit memory interfaces to 256MB of memory and both sport eight vertex-shader units, the X1900 GT has 12 more pixel-shader units than the 7800 GTX, while nVidia's part sports 16 raster-output pipelines to the ATI's 12. ATI fans, meanwhile, will correctly point out that nVidia's GPUs can't perform high dynamic-range lighting and antialiasing at the same time (you can enable one or the other, but not both).

SAPPHIRE RADEON X1900 GT The X1900 GT was a smart move on ATI's part; the company badly needed a strong mainstream part. In fact, we could just as easily have pitted the X1900 GT against nVidia's 7900 GT, since the price delta between the three is about the same.

Oblivion is one of the few games to offer both high dynamic-range lighting and full-scene antialiasing at the same time—but only with the "Chuck" patch and ATI's Catalyst 6.5 drivers (released two days after we'd finished our benchmarks).

But it's worth noting how the X1900 GT performed when we enabled 4x AA and 8x aniso with the HDR/Shader Model 3.0 games in *3DMark06*: The card slowed to a crawl in single-GPU mode, churning out just 2.3 frames per second in Game 1, and 5.1 frames per second in Game 2. In CrossFire mode, however, there was a less than 1 percent performance hit when we shifted from 8x anisotropic filtering with no antialiasing to 8x aniso and 4x AA.

BEST $350 CARD

As much as we hate calling ties, the 7800 GTX delivers far superior performance with Quake; but the X1900 GT's Oblivion performance is equally compelling. There's no clear winner here.

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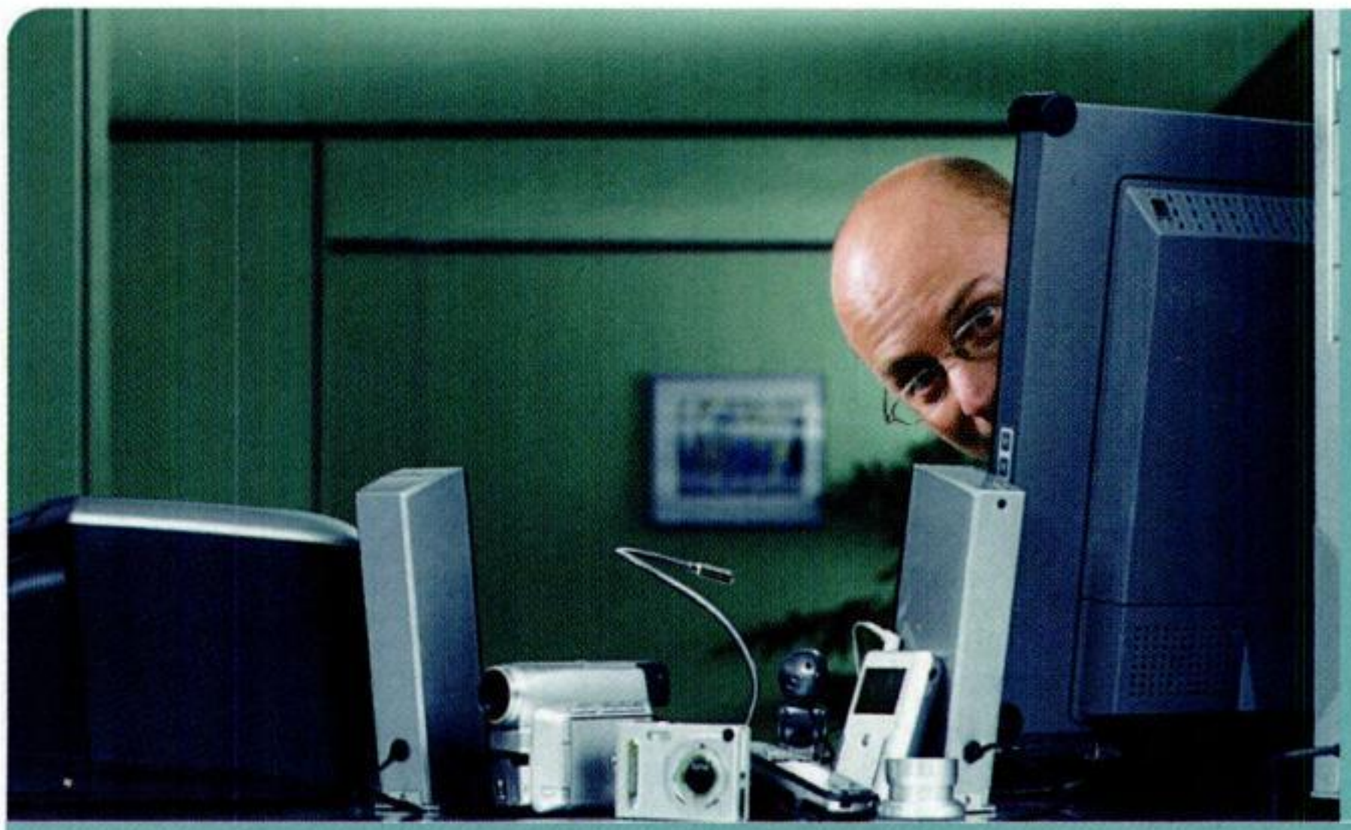

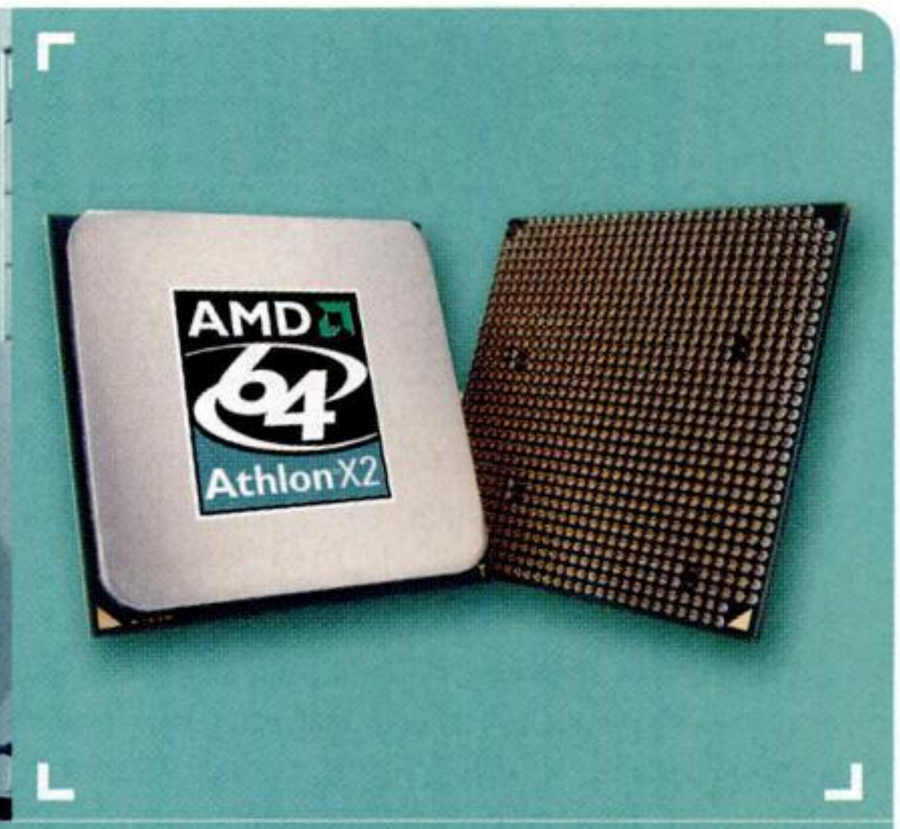

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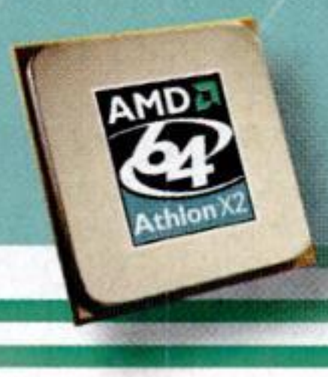

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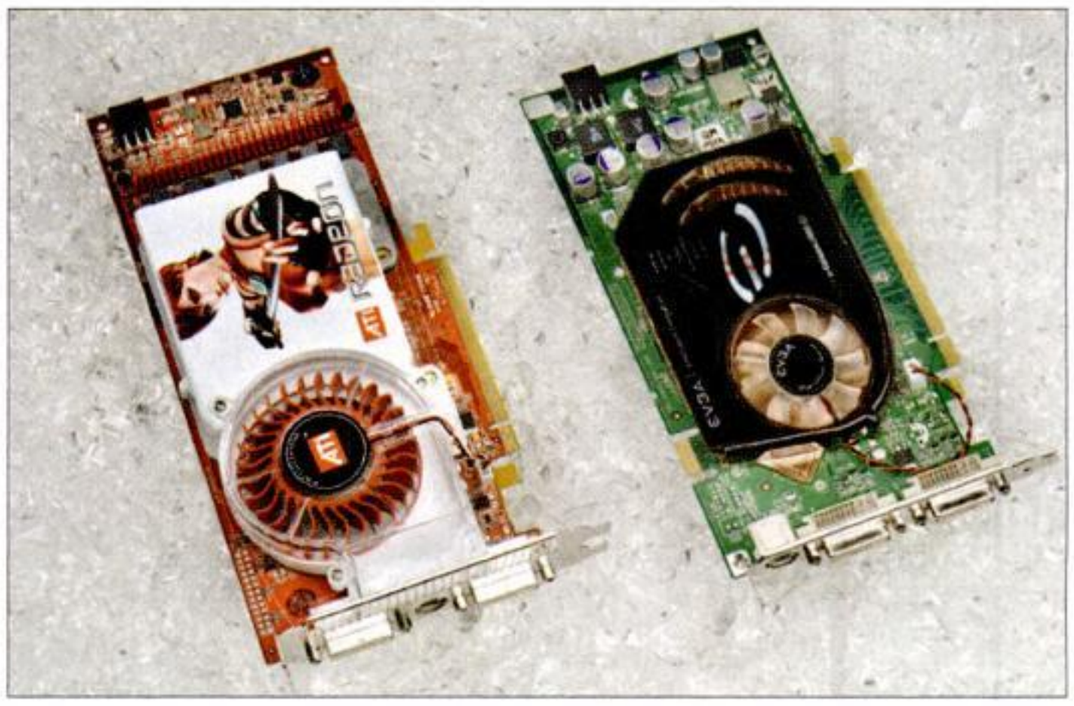
We're moving into white-tablecloth territory now. This is the place at which ATI and nVidia really start sharpening their knives



nVidia's GeForce 7900 GT (right) is a superb GPU, but ATI's X1900 XT outperformed it in our benchmarks.

EVGA GEFORCE 7900 GT nVidia liberally allows its add-in-board partners to factory-overclock its GPUs, and companies like EVGA really push the outer limits. The 7900 GT cards reviewed here are from EVGA's "Signature Pack" series, with cores that scream along at 600MHz and GDDR3 memory that's cranked up to 800MHz (compared to stock clock speeds of 450- and 660MHz, respectively).

It is possible, however, to take overclocking too far. Although we didn't encounter any problems in our testing in May, nVidia had posted a note on its forums in April reporting that some of the company's partners had driven "core and/or memory clocks… a bit too high above nVidia specifications." The post went on to say that "the situation is now under control."

DIAMOND RADEON X1900 XT ATI recently changed its position on factory overclocking and now officially encourages partners who build their own cards to overclock its GPUs; but for whatever reason, few vendors have chosen to do so. Diamond's Viper Radeon X1900 XT is a case in point: Its GPU runs at a stock 625MHz and its memory is set at 725MHz.

But the X1900 XT has two advantages over the 7900 GT: First, although ATI's GPU has fewer pixel pipelines—16 versus 24—each of those pipes feeds three pixel-shader units. Second, X1900 XT cards have 512MB frame buffers, compared to 256MB on 7900 GT cards. Even with its stock clocks, these factors helped Diamond's card out-perform EVGA's entry in nearly every benchmark, including *Quake 4.*

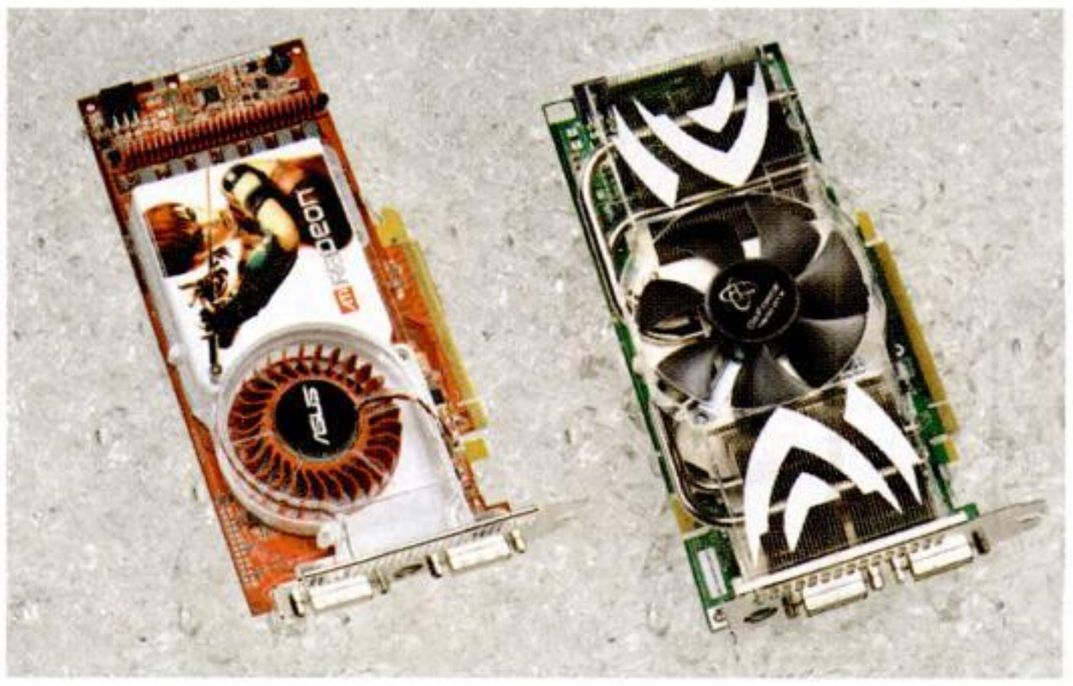
Aside from its crappy *HQV* performance, our biggest knock against the X1900 XT is its fan noise. That goes double when running in CrossFire mode.

BEST $400 CARD

Although we sometimes mistake the X1900 XT's cooling fan for a vacuum cleaner, we can find no fault with its gaming performance.

$500 Kobe Beef

These cards might not be massaged with sake before shipping, but they are the fastest single-GPU cards you can buy



It's the clash of the titans: the 48-shader-unit Radeon X1900 XTX (right) vs. nVidia's 24-shader-unit GeForce 7900 GTX.

XFX GEFORCE 7900 GTX The proxies for ATI and nVidia fought valiantly as they battled for supremacy in this highest of high-end categories. In the end, XFX's overclocked GeForce 7900 GTX enjoyed wide margins of victory in our *Quake 4, FEAR,* and *HQV* benchmarks, leaving us no choice but to award this card the win.

Looking at the 7900 GTX's 15 percent performance delta over the X1900 XTX running *Quake 4,* and the 50 percent advantage running *FEAR,* we're flat-out mystified as to why ATI doesn't expend the effort to build better OpenGL drivers. nVidia's advantage is even more pronounced when you look at the SLI-vs.-CrossFire numbers.

The fact that nVidia GPUs can't deliver high dynamic-range lighting and full-scene antialiasing at the same time doesn't bother us a bit. We also prefer nVidia's cooling solution. We wouldn't drop a dual-slot 7900 GTX in a home-theater PC, but at least it doesn't sound like a jet.

ASUS EAX 1900 XTX ATI's X1900 XTX is a pretty terrific GPU, but here's why we're not in awe of its ability to perform full-screen antialiasing and high dynamic-range lighting at the same time: When we enabled both 4x antialiasing and 8x anisotropic filtering in *3DMark06*, we lost five frames per second in Game 1 and three frames per second in Game 2. This wouldn't be a big deal if we were getting 60fps without AA, but we started out with just 32 and 35fps, respectively.

We were much more impressed with the X1900 XTX's performance with our benchmark tests that make heavy use of HDR: *Oblivion* and the HDR/Shader Model 3.0 games in *3DMark06.* ATI's X1000-series GPUs beat nVidia's 7 series GPUs in 10 out of the 12 races.

BEST $500 CARD

When you're spending this much money on a videocard, you expect the best. And that's what nVidia's GeForce 7900 GTX delivers.

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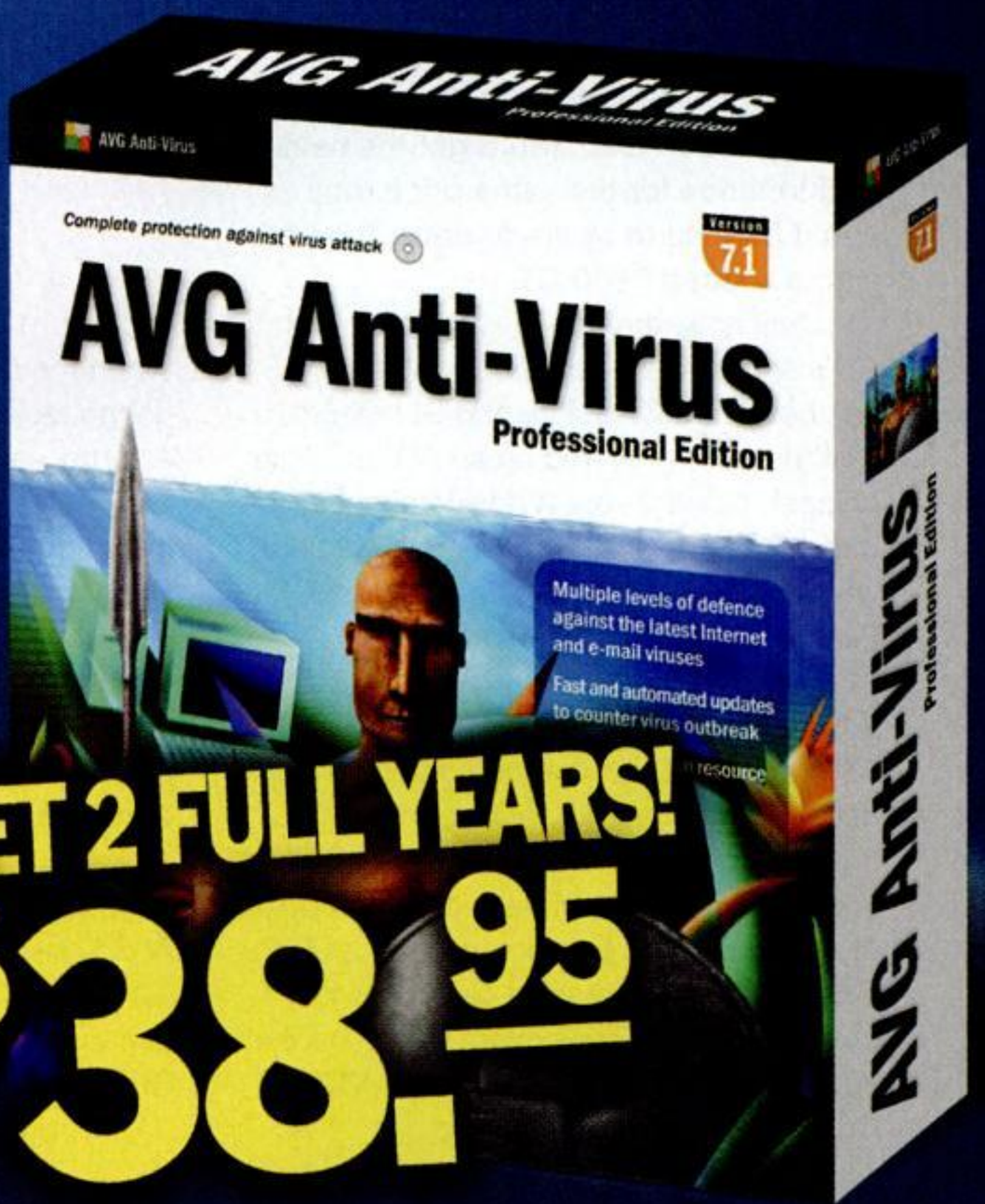

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Walling Data Systems

The Double-Cuts

Multiple GPU Configurations

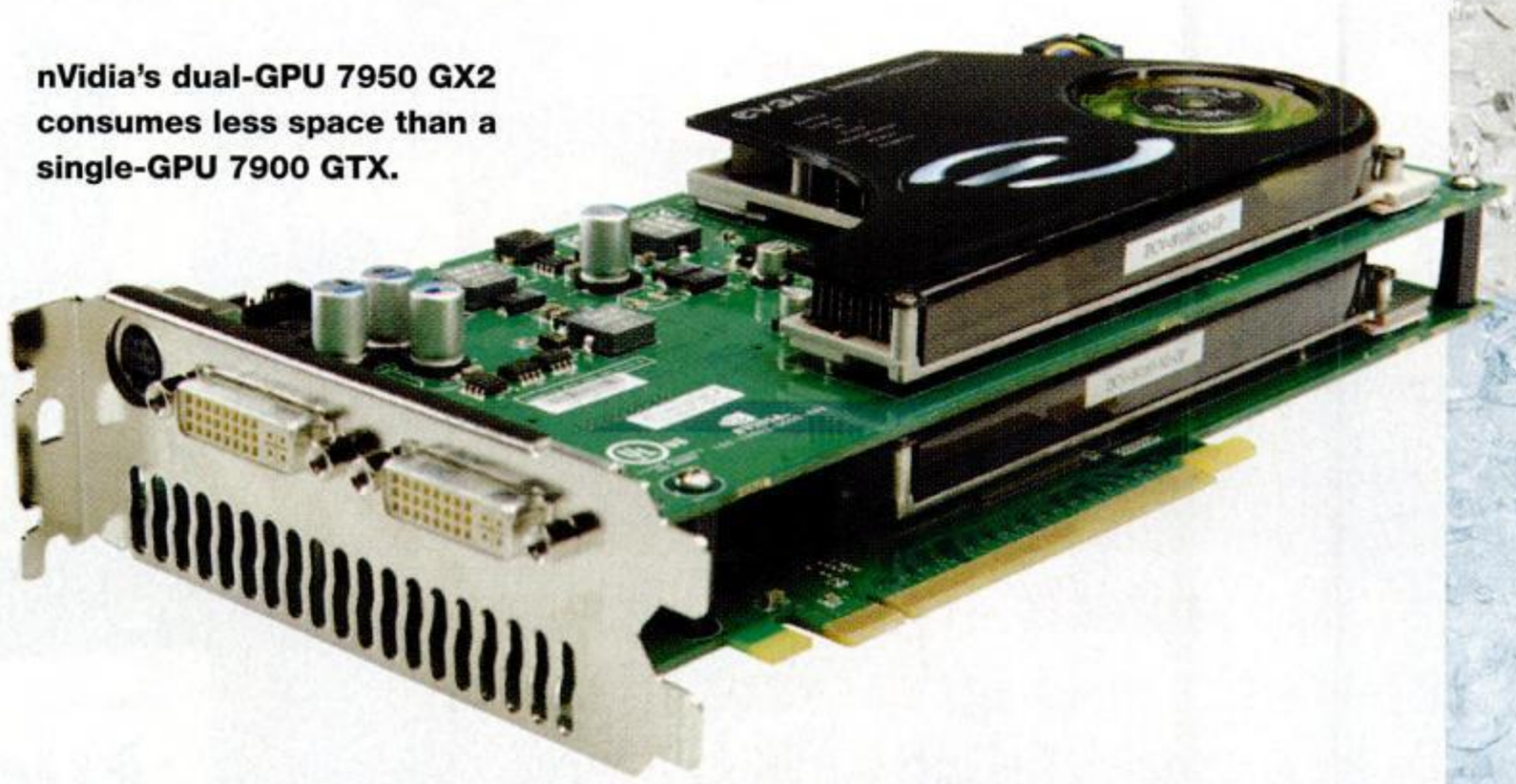
For folks with a particularly hearty appetite for graphics, ATI and nVidia serve up double portions of videocard power: SLI, the GeForce 7950 GX2, and CrossFire deliver twice as many GPUs and twice as much memory

As displays get larger and games become ever more graphically intense, the demands placed on your graphics card increase. And there's no more cost-effective way to boost your graphics horsepower than by plugging in a second GPU to handle the workload.

It won't always make economic sense to jump straight into dual-GPU mode. If you're shopping for an nVidia card, for instance, it would make more sense to buy one GeForce 7900 GT than two GeForce 7600 GTs. You'd get the same performance for the same price, but you'd be able to upgrade down the line with a second 7900 GT.

Until now, the one drawback to both ATI's and nVidia's dual-GPU solutions has been that CrossFire and SLI require a motherboard powered by an ATI or nVidia chipset, respectively. nVidia is changing that with its new GeForce 7950 GX2 card, which we'll also discuss here. But first, let's take a look at what ATI has to offer.

nVidia's dual-GPU 7950 GX2 consumes less space than a single-GPU 7900 GTX.



THE T-BONE: ATI CROSSFIRE

ATI's dual-GPU system couldn't be more different than nVidia's, at least not at the high end of the performance scale. If you're building CrossFire with an X1800 XL or XT, you'll need to pair it with an X1800 CrossFire Edition master card; likewise, creating a CrossFire system based on the X1900 GT, XT, or XTX requires an X1900 CrossFire Edition master card.

ATI's CrossFire solution just can't touch nVidia's SLI.

When the slave card has finished its rendering task, it transfers the data over an external cable to the master card. A compositing chip on the master card combines this information with its own to create the finished frame.

CrossFire systems based on anything else in ATI's lineup, from the X1800 GTO on down, don't need a master card or the external cable; the PCI Express bus is capable of handling the data exchange.

THE PORTERHOUSE: NVIDIA SLI

nVidia cards don't need a master card because each GeForce 6- and 7-series GPU has a compositing engine baked right in. Higher-end cards (GeForce 6600 GT and up) require an internal SLI connector, because the PCI Express bus can't handle the traffic.

Any GeForce 6- or 7- series card can be paired, regardless of memory or core clock speeds, as long as both cards have the same GPU and the same-size frame buffers. SLI is such a well-designed solution for increasing graphics horsepower that it's even beginning to show up in notebook computers.

THE STUFFED CHOP: GEFORCE 7950 GX2

nVidia's brand-new GeForce 7950 GX2 packs two 7900-class GPUs and two 512MB frame buffers into a package that's thinner than a single 7900 GTX card. What's more, it brings SLI performance to any PCI Express-compliant motherboard—there's no need for an nForce chipset.

The 7950 GX2 delivered significantly faster benchmark results than any other single-slot graphics solution we tested. When compared with other nVidia reference designs, it was slightly faster than two 7900 GTs running in SLI, but significantly slower than a pair of 7900 GTXs.

All three GPUs feature 24 pixel-shader units and eight vertex-shader units, but the 7950's 500MHz core clock speed is well below that of the 650MHz 7900 GTX, and it's only slightly faster than the 450MHz 7900 GT. Its 512MB frame buffer is twice the size of the 7900 GT, but its stock memory clock runs 60MHz slower than the GT and a full 200MHz slower than the 512MB of memory on the 7900 GTX.

It stands to reason that if two are better, four must be incredible. Unfortunately, the only way to get a quad-SLI system today is to buy a new PC pre-equipped that way. Although nVidia hasn't ruled out the possibility of supporting quad-SLI as an end-user upgrade solution, the company isn't supporting it now.

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Rendering a Verdict

ATI ekes out a couple of wins in the single-GPU competitions, but the company gets slaughtered when it comes to dual-GPU configurations.

CrossFire is an expensive kludge. The average price of both types of CrossFire master cards is about $525, which puts a top-end CrossFire configuration well north of a grand. And while it's true that a single X1800 GTO beats the stuffing out of a single 7600 GT, ATI's advantage shrivels in dual-card mode.

nVidia has also managed to shrink ATI's lead in video quality. When ATI finally turned on the X1000-series' Avivo features, we thought it would be difficult for the Green Team to catch up. But, with the exception of noise reduction, nVidia's engineers have tweaked their ForceWare drivers to match and in many cases surpass ATI's best video-rendering efforts.

And we'll say it one more time: it's just plain dumb that ATI can't deliver high-quality DVD video playback in CrossFire mode. But the biggest question of all is: Does ATI have a $600 rabbit to pull out of its hat that can beat nVidia's GeForce 7950 GX2? MPC

Specs

	CORE CLOCK (MHZ)	MEMORY CLOCK (MHZ)	TOTAL MEMORY (MB)	INTERFACE TO MEMORY	PIXEL SHADER UNITS	VERTEX SHADER UNITS
XFX 7600 GT (XXX Edition)	590	800	256	128-bit	12	5
Connect3D X1800 GTO	500	500	256	256-bit	12	8
EVGA 7800 GTX	490	650	256	256-bit	24	8
Sapphire X1900 GT	600	575	256	256-bit	36	8
EVGA 7900 GT	600	800	256	256-bit	24	8
Diamond X1900 XT	625	725	512	256-bit	48	8
XFX 7900 GTX	700	900	512	256-bit	24	8
Asus EAX1900 XTX	650	775	512	256-bit	48	8
EVGA 7950 GX2	500	600	512 x 2	256-bit	24 x 2	8 x 2

Benchmarks

		PRICE	3DMARK06 HDR/SM3 GAME 1 (FPS)	3DMARK06 HDR/SM3 GAME 2 (FPS)	QUAKE 4 (FPS)	OBLIVION (FPS)	FEAR (FPS)	HQV SCORE
SINGLE-CARD	**XFX 7600 GT (XXX Edition)**	$180	6.6	9.7	23.4	12.6	**19**	**88**
	Connect3D X1800 GTO	$230	**8.4**	9.7	**28.8**	**12.7**	13	63
	EVGA 7800 GTX	$375	10.5	**15.0**	**42.0**	14.6	**30**	**88**
	Sapphire X1900 GT	$330	**13.2**	14.5	35.5	**19.2**	21	63
	EVGA 7900 GT	$360	12.5	17.6	49.2	16.1	**34**	**88**
	Diamond X1900 XT	$400	**16.8**	**18.2**	**52.5**	**23.0**	27	63
	XFX 7900 GTX	$495	15.0	**20.7**	**66.7**	19.5	**42**	**88**
	Asus EAX1900 XTX	$530	**18.4**	20.0	58.0	**21.2**	27	63
	EVGA 7950 GX2	$600	19.3	27.3	89.3	22.7	57	88
DUAL-CARD	**2 XFX 7600 GT (XXX Edition)**	$360	12.3	**18.6**	44.9	**12.8**	**34**	**88**
	2 Connect 3D X1800 GTO	$460	**12.6**	9.8	**54.3**	12.7	19	0
	2 EVGA 7800 GTX	$750	19.2	**27.9**	**70.6**	14.7	**52**	**88**
	Sapphire X1900 GT ATI X1900 XT CrossFire	$855	**21.1**	13.1	65.9	**18.3**	30	0
	2 EVGA 7900 GT	$720	22.7	33.1	83.6	15.9	**63**	**88**
	Diamond X1900 XT ATI X1900 XT CrossFire	$960	**31.8**	**34.9**	**95.2**	**22.3**	39	0
	2 XFX 7900 GTX	$990	27.8	**38.1**	**113.8**	20.2	**70**	**88**
	Asus X1900 XTX ATI X1900 XT CrossFire	$1,055	**32.0**	35.2	92.7	**22.0**	39	0

Best scores are bolded. We run videocard benchmarks at 1920x1200 resolution. **3DMark06 HDR tests: Antialiasing was turned off and anisotropic filtering set to 8x. **Quake 4:** AA was set to 4x and aniso set to 8x. **Oblivion**: AA was turned off, high dynamic-range lighting turned on, and all other values set to maximum. **FEAR**: AA was turned off and soft shadows enabled.*
***We ran ATI benchmarks on an Asus A8R32-MVP Deluxe motherboard. For our nVidia tests, we used Asus' A8N32-SLI Deluxe. We used a 2.6GHz, dual-core AMD FX-60 CPU and 2GB of DDR400 memory in each. We used a Viewsonic 23-inch VP2330wb display at its native resolution of 1920x1200.*

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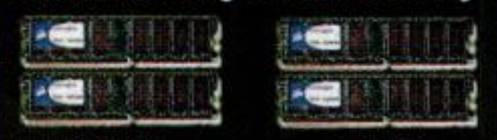

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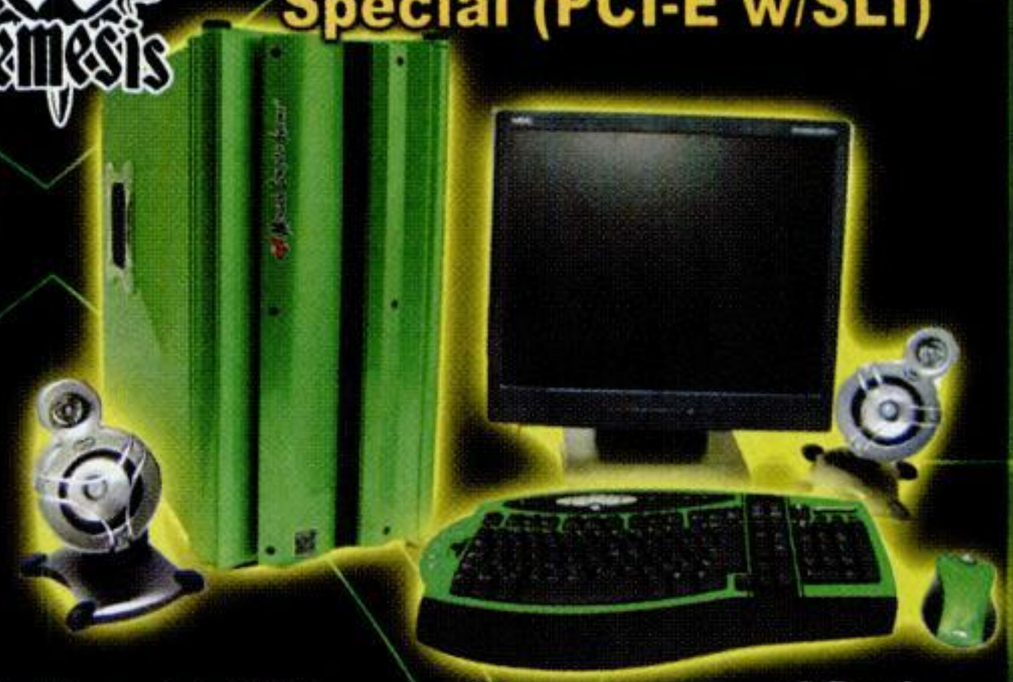

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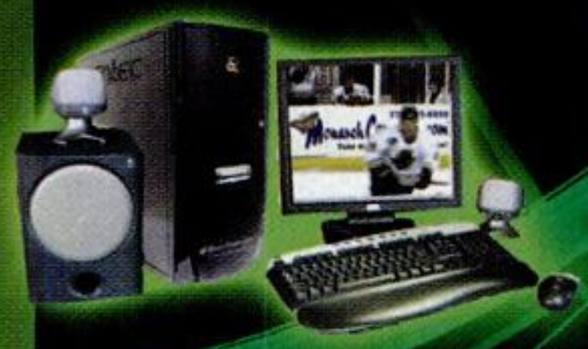

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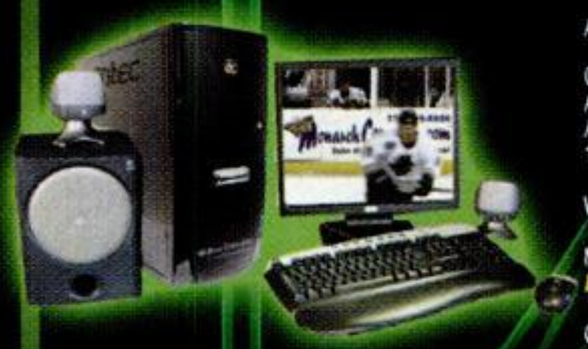

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AM2 HAS LANDED

AMD's new Socket AM2 brings DDR2 support to Athlon aficionados, with a new socket and CPU

BY GORDON MAH UNG

Ever since AMD introduced its Athlon 64 CPU, much has been made of the on-die memory controller that many credit for the chip's superior performance. But that controller, while fast, has also handcuffed the chip. While Intel has been touting DDR2 support for two years, AMD has been stuck with DDR.

Even worse, while there's no confusion over the Pentium 4's compatibility with DDR or DDR2 motherboards—with Intel the chipset you have determines the memory type—AMD's move to DDR2 presents a huge problem. If DDR and DDR2 CPUs share the same socket design, there's a risk that people could plug DDR2-only CPUs into DDR motherboards or vice versa.

Until now, AMD was able to justify its aversion to DDR2, given the memory's slow latency and high price. But recent price drops and improved latencies have forced AMD's hand, and the company is now ready to embrace DDR2 with its new Socket AM2. In the following pages, we'll answer all your burning questions about AMD's new socket and bring you up to speed on the brave new world of AM2.

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Q: I loved Socket 939. Why did AMD have to replace it? Why not just add DDR2 and DDR capabilities to the same chip?

A: AMD says it would have been technically possible to jam both a DDR and DDR2 controller into the chip, but it would be akin to building a car with two transmissions—it simply doesn't make sense. With the entire industry moving to DDR2, AMD didn't see any reason to retain DDR support. Chris Rock said it best: "Sure, you can drive a car with your feet, but is it a good idea?" Would it have been a good idea for AMD to build PC133 SDRAM support as well as DDR into the Athlon 64? Hell no. We'd rather have AMD (and Intel for that matter) allocate transistors to additional features and more performance than legacy support that won't get used.

AMD also says that it's quite possible many of the existing chipsets on the market today could work with AM2 (as the memory controller is in the CPU), but that companies will likely opt to introduce new chipsets at this juncture. Because you'll have to buy a new motherboard just to support AM2 processors, it makes sense to get the most updated chipset as well, rather than an older chipset with a new socket stuck on.

Q: I've heard AM2 also called Socket 940. Isn't that the same socket AMD introduced with the Athlon 64?

A: No, AM2 and Socket 940 are not the same, although both sockets do have 940 pins. AMD's original Athlon 64 FX-51 platform was based on the Opteron's Socket 940. In fact, the original FX-51 was nothing more than a rebadged Opteron. The original Socket 940 is totally incompatible with the new Socket AM2, and is mostly obsolete today. Going forward, we'll always refer to the new socket as Socket AM2, to avoid confusion.

Q: Will my old heatsink and fan work with the new AM2 socket? How long will AM2 be around?

A: AMD took advantage of the socket switch to beef up the design of the retention mechanism, to better support today's larger, heavier cooling devices. Socket AM2 sports a heftier four-screw design to affix the backplate to the cooler mount, instead of the older two-screw design introduced with the original Athlon 64. With hundreds of existing heatsink/fan designs, some will work with the new retention mechanism and others won't. Socket AM2 will likely be incompatible with many heatsinks that clip onto the CPU bracket, for instance, and water-cooling apparatus that bolt through the motherboard will require updated retention devices.

As for the socket's lifetime, AMD makes no promises as to how long it will support the new socket, but consider the longevity of Socket 939, which took us from FX-53 all the way to FX-60. Of course, getting two years of use from a socket is pretty rare. Industry trends and pressures (such as DDR3) could very well make the new AM2 obsolete faster than anyone expects. AMD's original Socket 940 didn't last a year. It ended with the FX-53, when AMD was able to transition to the more economical Socket 939 CPUs that didn't require registered memory.

Q: Enough about the socket, tell me about the new CPUs.

A: AMD is hitting full-force with a slew of high-performance, budget, and low-power CPUs that will work with AM2. The top chip is the dual-core Athlon 64 FX-62, which clocks in at 2.8GHz and includes DDR2/800 support. Also aboard is AMD's Virtualization, which is the company's answer to Intel's VT support. Like VT, it lets you run multiple operating systems on a single machine at full speed, switching between them at will. Eventually you should be able to spawn a game or application as its own OS partition. If an app or game crashes, it should only take down its own partition. The FX-62 features two cores in the same die, each with 1MB of L2 cache. The new "Windsor" core is essentially the same basic K8 design used in the FX-60; the only significant changes are the addition of DDR2 and Virtualization support.

The FX-62 is the top-end part, but AMD will also offer an Athlon 64 X2 5000+ (2.6GHz with 512KB L2) and lower chips. Of interest to the anti-noise and small formfactor crowd are AMD's new low-wattage chips. The "Energy Efficient" AM2 version of the X2 4800+ will put out 65 watts (the Socket 939 X2 4800+ churned out a whopping 110 watts). The EE 3800+ X2 will dip down to an amazing 35 watts, which is nearly on par with some of the hotter mobile CPUs.

ATHLON 64s **COMPARED**

	ATHLON 64 FX-62	ATHLON 64 FX-60
CLOCK / CORES	2.8GHz dual core	2.6GHz dual core
INTERFACE	Socket AM2	Socket 939
RAM SUPPORT	DDR2/800	DDR400
L1	128KB	128KB
L2	2MB (1MB per core)	2MB (1MB per core)
TRANSISTOR COUNT	227.4 million	223.5 million
DIE SIZE	230mm2	199mm2
MAX THERMAL POWER	125 watts	110 watts
PROCESS	90nm DSC SOI	90nm SOI
CORE CODE-NAME	Windsor	Toledo
PRICE AT LAUNCH	$1,031	$1,031

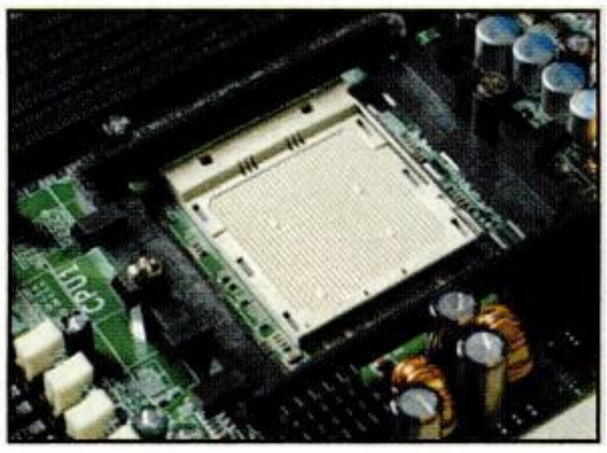
Q: How can I tell the difference between the Energy Efficient chips and the normal CPUs? Are they made at the same factory?

A: The power-friendly retail CPUs will bear the Energy Efficient label and cost an additional $30 over the hotter CPUs. If you want to buy the green OEM versions, you will need to dig into the OPN (AMD part number) to tell the difference. The third digit of the OPN will denote what energy state it supports. An "A" means normal power, an "O" means 65-watts, and a "D" denotes 35-watts. The Energy Efficient chips are indeed made at the same factory on the same line as the other CPUs. AMD says it specifically targets a portion of chips moving through the line for low-power consumption. AMD says it performed a similar trick with Socket 939 chips: Initially all of the X2 chips were rated for 110 watts. As AMD's process tech improved, it was able to offer many of the same CPUs at 89 watts.

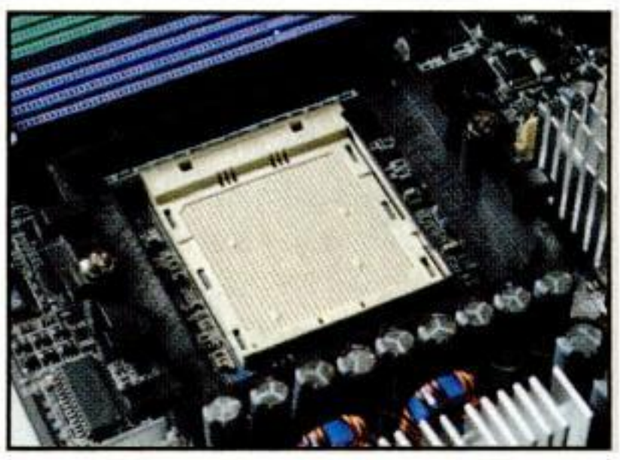
Q: Besides the DDR2 and Virtualization support, has AMD made any other changes under the hood?

A: The company says a few house-cleaning changes were made to the die, but for the most part, it's pretty much the same as the previous-generation CPU. It's hard for us to say exactly what changed without hacking into AMD headquarters *Mission Impossible*-style. Interestingly, this 90nm core is more than 10 percent larger than the previous 90nm core, and adds about 5 million transistors to the pile. Most of that is probably from the DDR2 controller and Virtualization support, but we can already imagine the conspiracy

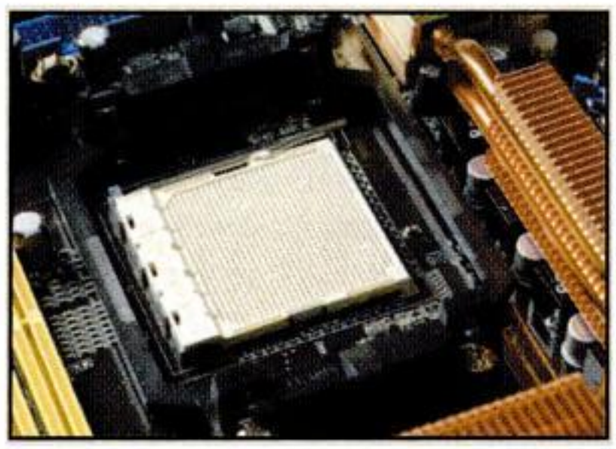
Socket to Me!



The original Socket 940 introduced the Athlon 64 FX-51 to the world and set the stage for a race that has left Intel in the dust for two years straight. Socket 940 was short-lived, however, and carried but two processors: the 2.2GHx FX-51 and the 2.4GHz FX-53.



A true warrior, Socket 939 is being put to pasture, but it will likely be enshrined in the silicon hall of fame. Just about every S939 motherboard made worked with the original single-core FX-53, all the way up to the powerful dual-core FX-60. You can't say the same for Intel's LGA775, which physically remained the same but has gone through numerous electrical/chipset changes over its life, in order to stay competitive.



No one can predict the future, but motherboard vendors have all embraced AM2 and the major chipset vendors are stepping up with feature-rich parts to support AMD processors running on the new socket.

theories about secret features. There's some precedent for this: Chip companies have slipped new technology into core refreshes without initially enabling them. Intel slipped Hyper-Threading into the Northwood cores, but didn't enable it for months. That said, you shouldn't hold your breath waiting for AMD to eventually switch on some secret "Intel ass-kicking" feature in the FX-62.

Q: What is the rest of the Athlon lineup going to look like? Will AMD offer single-core CPUs any more?

A: Here's how AMD's CPU offering breaks down for dual-core:

- Athlon 64 FX-62 (2.8GHz/1MB L2 per core)
- Athlon 64 X2 5000+ (2.6GHz/512KB L2 per core)
- Athlon 64 X2 4800+ (2.4GHz/1MB L2 per core)
- Athlon 64 X2 4600+ (2.4GHz/512KB L2 per core)
- Athlon 64 X2 4400+ (2.2GHz/1MB L2 per core)
- Athlon 64 X2 4200+ (2.2GHz/512KB L2 per core)
- Athlon 64 X2 4000+ (2GHz/1MB L2 per core)
- Athlon 64 X2 3800+ (2GHz/512KB L2 per core)

The single-core SKUs are simpler:

- Athlon 64 3800+ (2.4GHz/512KB L2)
- Athlon 64 3500+ (2.2GHz/512KB L2)

Q: What's all the fuss I'm hearing about the memory clocks on the Athlon CPUs with odd-number multipliers?

A: The FX-62 runs on a 200MHz reference clock, which many would call its front-side bus (technically, the Athlon 64's integrated memory controller negates a front-side bus, but we digress). Take the 200MHz clock and multiply it by the multiplier of the CPU, which for the FX-62 is 14, and you get the overall clock speed of the chip (200 x 14 = 2800). Because the memory controller is internal to the CPU, you also have to use an internal divisor to generate the clock speed of the RAM. In the case of the FX-62, its default divisor is 7. So, 200MHz x 14 multiplier = 2800MHz. Divide by 7 to get 400MHz, which, once the DDR2 multiplier is applied, equals DDR2 @ 800MHz.

Because AMD only uses whole-number multipliers and divisors, you run into problems with the "odd" multiplier chips, such as the Athlon 64 X2 5000+, when trying to generate the 400MHz needed for DDR2/800.

In the case of the X2 5000+, it uses the same 200MHz reference clock, with a multiplier of 13 and a memory divisor of 7. Worked out, that's: 200 x 13 / 7 = 371MHz x 2. That means your DDR2/800 RAM would be running slower than with the FX-62, at 742MHz. The divisor can be changed, but only by a whole number. Going to 6 would increase the memory to 866MHz. With the DDR Athlon 64s, the problem didn't manifest because the divisor was the same as the reference clock. For an Athlon 64 FX-60 running at 2.6GHz on a 13x multiplier, getting to the 200MHz needed for DDR400 was easy: 200MHz reference clock x 13 multiplier = 2600MHz CPU / 13 = 200MHz x 2 for DDR400 @ 400MHz. Are you confused yet?

The practical upshot is that it's more of a public relations problem than a performance problem. The performance hit from losing 58MHz in memory bandwidth will be virtually nil in most real-world applications. Granted, it will nonetheless be irksome to "odd" Athlon 64 users every time they boot and see the RAM running at *only* 742MHz.

Q: How much faster is AM2 and the FX-62 than FX-60? Will it beat Intel's upcoming Core 2 Duo?

A: AMD has a problem with managing the wild expectations of its loyal customers. Without spoiling our benchmark report at the end of this story, let's just say that the new FX-62 is more of a side-step than a jump forward. At a minimum, it offers a 200MHz-per-core increase over the FX-60. It also offers a building block for future CPUs. FX-62 is the beginning, not the end of the Athlon 64s. Is it enough to beat Intel's Conroe/Core 2 Duo/Core 2 Extreme parts? AMD has the PR spin machine working full-time reminding the media that

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Conroe hasn't launched and isn't expected for "months." That's mostly true (although we hear C2E will be here far sooner than AMD hopes), and while we're firm believers that one CPU in hand is better than two in the fab, we can smell a possible beat-down from a mile away—200MHz just might not be enough. Intel's been displaying more swagger and bluster than it has in, well, years. Of course, until we can test Conroe in our own Lab, we won't know which is faster. What we can say is that if Conroe doesn't live up to the Intel-generated hype, it'll be the end of Intel.

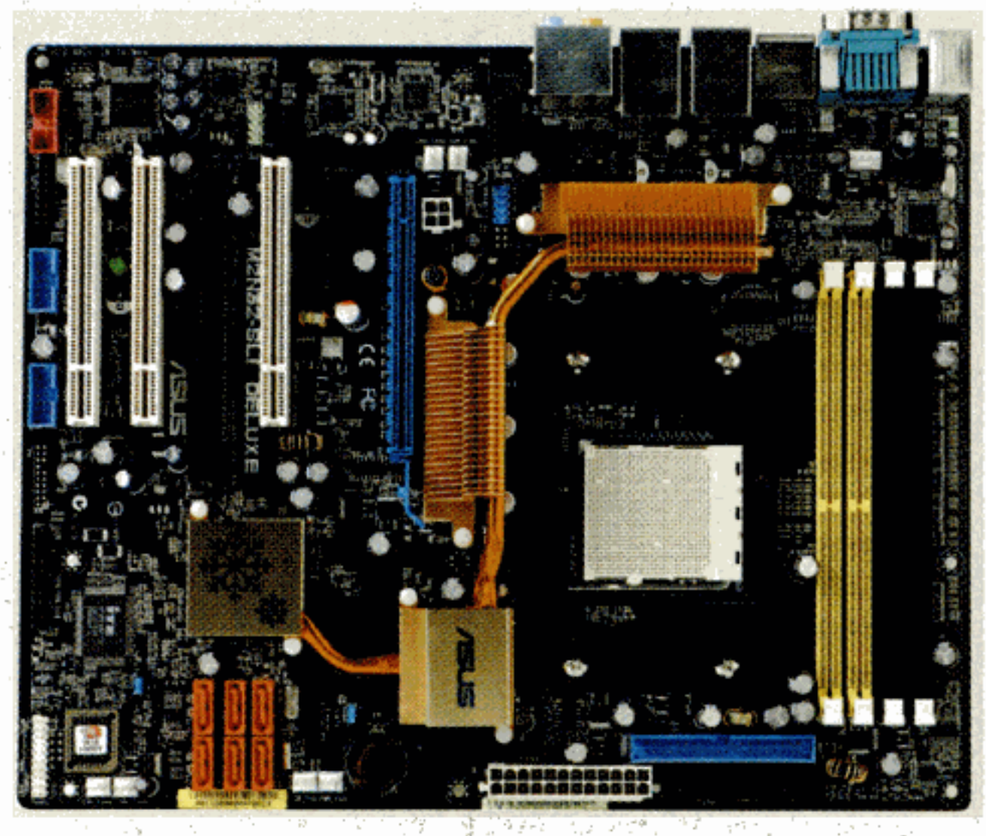
Q: What's next for AMD?

A: AMD says it has seen a blurring of the lines between its FX series and X2 series. For the most part, the FX has offered a little more clock speed or a little more cache (as well as an unlocked multiplier). To help set the two chips apart, the company is considering a 4x4 project, which delivers consumer chips with two dual-core processors on a single motherboard. The 4x4 concept would give high-end users access to four CPU cores long before either AMD or Intel would be able to build quad on a single CPU die. To give 4x4 more consumer appeal, AMD is pushing for motherboard designs that don't require more expensive, slower registered RAM, and that offer enthusiast features, such as overclocking.

The 4x4 CPUs probably won't use the Socket AM2, but rather the server/workstation Socket F with its dual-processor configuration. If the 4x4 concept sounds like AMD took a cue from *Maximum PC's* Dream Machine 2005, you might be onto something. AMD officials tell us the company considered the dual-core, dual-processor Opteron machine that *Maximum PC* built last year when it greenlighted 4x4. As proponents of more power and more cores, we think it's great. We can't wait for a dual-processor, quad-core machine. Eight cores, baby! Now if we can only get Apple to give *Maximum PC* credit for its dual-core, dual-processor G5 machines.

Introducing the nForce 500

nVidia's nForce 500 series of chipsets takes AMD processors to the next level with a slew of badass features



AMD prides itself on being friendly to third-party chipset makers, so it's not surprising that the success of its processors has always been closely tied to a core-logic chipset. This time, AMD's launch partner for Socket AM2 is nVidia's top-end nForce 590 SLI chipset. Who says an AMD chipset can't be exciting?

More-Overclockable Memory

One of the more significant moves by nVidia is its partnership with Corsair, to extend the memory information contained in the SPD chips on sticks of memory (see this month's Quick Start section for more details). The special SPDs will include voltage and command rates, which they don't currently boast. New memory that uses this technology, dubbed "SLI-Ready Memory," will make it easier to wring the most power from RAM.

Torrent-Ready

Can't download a torrent and play online games at the same time? nVidia's "FirstPacket" should let you do just that, by prioritizing game packets so they get to the front of the Ethernet line. The feature promises to do for your network traffic what dual-core did for multitasking.

Think Big

The nForce 590 SLI gets six SATA ports, which will support either one big-ass RAID 0 or RAID 5 array, or two separate RAID 5 arrays. Gone is the ability to span RAID across parallel and SATA devices, but who the hell used that anyway? nVidia does support SATA 3G, but doesn't support Intel's Advanced Host Controller Interface mode, which lets the drive transfer directly to main memory without the CPU playing referee. Why? Intel requires that vendors license the feature, and we all know how much Intel and nVidia love to license each other's technology, don't we?

Power Gigabit, Unite!

While it's become a fad for mobos to sport two Gigabit Ethernet ports, it's been a feature of limited value. Now, nVidia's "DualNet" lets you aggregate both Gigabit ports into one big fat 2Gb connection without the need for a specialized router or switch. If you need more speed but have only a fast Ethernet switch, you can aggregate two 100Mb ports and run at 200Mb on your older switch.

Semi-Automatic Kinda-Sorta Overclocking

nVidia says the "LinkBoost" feature of the nForce 590 SLI chipset is not overclocking, but if you plug a 7900 GTX card into a 590 board, the chipset will clock the PCI Express bus 25 percent higher to increase the bandwidth to the videocards. Note that we said "PCI Express bus" not the actual GPU. That means the bandwidth to the videocard goes up 25 percent, so how much actual performance difference you see will depend on the application. Why isn't this overclocking? nVidia says it has prequalified all 7900 GTX parts to run at the higher speeds, so you're not going beyond spec, you're just, er, getting the most from your card.

The Benchmark Results

FX-62 is the fastest dual-core processor we've tested, but it's a little less exciting than we'd hoped it would be

The Tests

We assembled a bevy of benchmarks that we know to be CPU bound, to see just how well the new FX-62 compares with the FX-60 in a head-to-head battle. We also threw in some older benchmarks and ran them at low resolutions to stress CPU and memory performance.

Furthermore, we wanted to know whether there was any memory-performance boost from the move to DDR2, so we overclocked the 2.6GHz FX-60 to 2.8GHz by increasing it's multiplier a tick. This gave us a perfect DDR400 vs. DDR2/800 showdown. Because we couldn't use the AM2 and Socket 939 processors on the same chipset, we used Asus' new M2N32-SLI motherboard, which features nVidia's nForce 590 SLI chipset, and a pair of 1GB Corsair low-latency DDR2/800 DIMMs for the FX-62. (Lower latency DIMMs became available as we were running our tests, but we had issues getting the board and its BIOS to recognize the DIMMs. We'll revisit low-latency memory in a forthcoming issue.) On the FX-60 side, we used an Asus A8N32-SLI board equipped with 2GB of Corsair DDR400 RAM. The videocard, hard drive, OS, PSU, and drivers were the same for both configs.

The Conclusion

If you were expecting a volcanic eruption of power, our tests don't show it. For the most part, Athlon 64 FX-62 is FX-60 plus 200MHz, with a tiny boost coming from the DDR2/800's extra memory bandwidth. There's virtually no performance improvement from the new memory or CPU architecture—we saw just a 1-to-3 percent performance delta between the FX-60 and FX-62 when we ran them at the same clock speeds. It's not much to write home about.

Compared with the stock-clocked FX-60, which is arguably the fastest consumer CPU available today, the FX-62 scales well. For the 7.7 percent clock increase, you get roughly a 7 percent performance increase in the majority of our CPU-bound benchmarks, which indicates that there's plenty of life left in the K8 design, so long as AMD can continue to crank up the clock frequencies. That makes the Athlon 64 FX-62 the hands-down performance leader today.

Still, we can't give the FX-62 that crown without noting the storm clouds on the horizon signaling the imminent release of Intel's Core 2 Duo and Core 2 Extreme processors. All we can say is, it's going to be long, hot summer. MPC

BENCHMARKS

	AM2	S939	S939
	2.8GHz Athlon 64 FX-62	2.6GHz Athlon 64 FX-60	2.8GHz Athlon 64 FX-60
3DMARK2001 SE	**35,723**	33,786	35,306
3DMARK06	6,138	6,076	**6,158**
FEAR (FPS)	**213**	190	207
QUAKE III (FPS)	**578**	538	563
SISOFT SANDRA MEMORY BANDWIDTH (MB/S)	**7,300**	5,945	5,980
PREMIERE PRO 2.0 HDV TEST (SEC)	**2,676**	2,870	2,721
PHOTOSHOP CS2 ACTION SCRIPT (SEC)	**278**	290	282
NOISE NINJA DIGITAL IMAGE NOISE REDUCTION TEST (SEC)	**2,072**	2,248	2,129
BIBBLE 4.7 BATCH RAW CONVERSION TEST (SEC)	**773**	826	783

Best scores are bolded.

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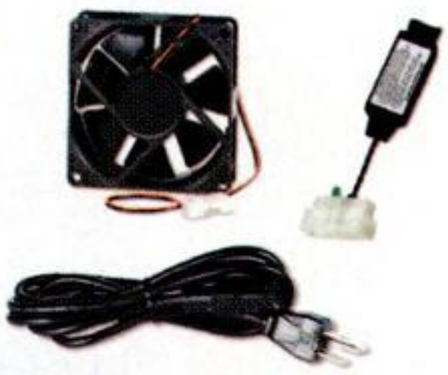

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PHOTOGRAPHY BY MARK MADEO

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What's it gonna take for us to get you into one of these babies? We've got 10 lovely ladies here, waiting to go home with you. Don't think you can afford one of these all-aluminum beauts? Don't worry about that, Carl in financing will take really good care of you!

BY JOSH NOREM

Strolling the case section at your local Fry's or CompUSA is a lot like driving the "motor mile" out by the airport: There are so many tantalizing cases to choose from it boggles the mind. Even though the majority of cases on the market are ATX mid-towers, they come in every size, shape, and color imaginable. From cubes to pyramids to standard rectangular boxes, the variety of cases available these days is both delightful and agonizing at the same time. We feel your pain.

To ease your suffering, we've rounded up 10 A-list cases from across the cost spectrum. We've got cases as cheap as $100 (no PSU included, of course) all the way up to $400 works of art, and everything in between. We dragged each case into the Lab, loaded them with our zero-point system parts, then ran the machine for a few hours to judge cooling and noise before we rendered our verdicts. Each verdict factors in a case's cooling and airflow capabilities, its features (or lack thereof), its user friendliness, and its overall build quality.

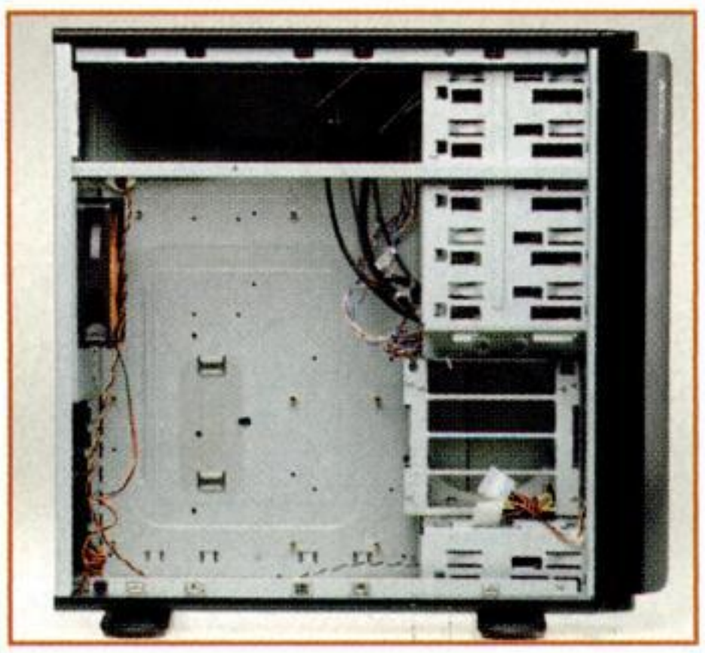
We're happy to report that there are some awesome cases out there, for any budget. Read on to see how these 10 fared and to see which cases we declared the overall winners.

Thermaltake Armor Jr.

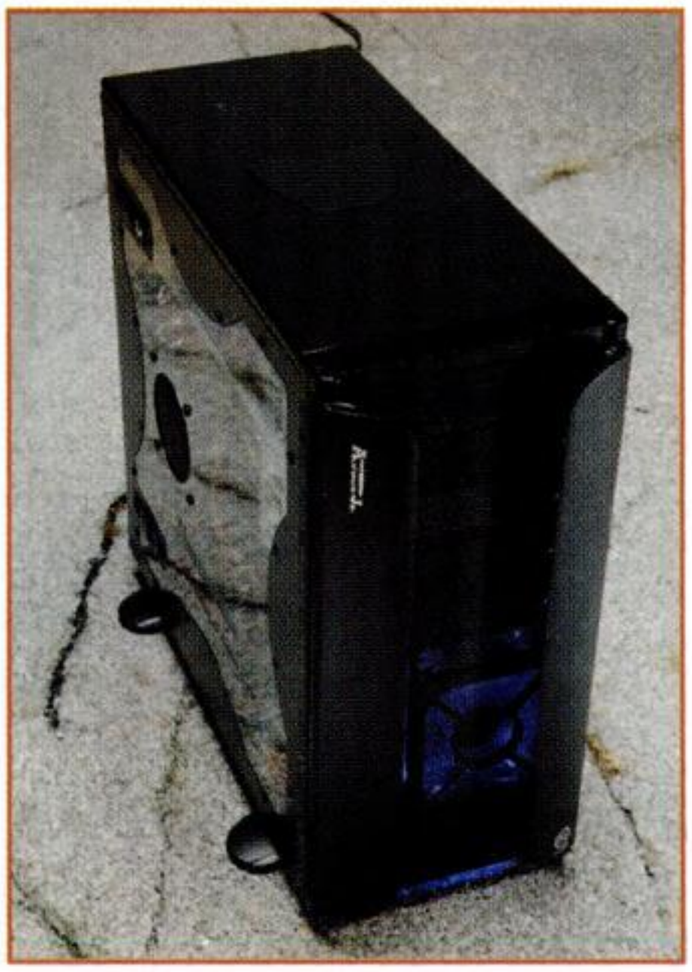
A little case with big ambitions

The aptly named Armor Jr. is a smaller, mid-tower version of Thermaltake's gigantic Armor case—a case that ruled our Best of the Best list for most of 2005. The smaller version is just what the doctor ordered, as the regular Armor is a bit *too* big for most people, and a little flimsy. The Armor Jr. is rock-solid, elegant, and a delight to work in. Though it's missing some of the Armor's more extravagant features, it's still a helluva mid-tower.

The steel chassis has a plastic front bezel with aluminum wings. The door can be locked shut to prevent people from mucking with your 5.25-inch drives. There are a total of six 5.25-inch bays, including one at the bottom of the case designed to hold a water-cooling reservoir. The 5.25-inch drives use clip-on drive rails that are a snap to install. There's also a vertically oriented cage next to the intake fan designed to hold a Raptor X hard drive, which sits flush with the case window in order to show off the hard drive's internals.



The power supply mounts in the top of the case and can be flipped upside down if you don't want it sucking air from the CPU area.



The vertical space next to the front intake fan is designed to hold a Raptor X hard drive, so you can ogle it's internals through the case window.

The internal drive cage holds four hard drives. We love its rubber grommets, which ensure silent operation. A silent 12cm fan with blue LEDs sucks air into the case and blows it over the drives. The expansion cards are secured using a plastic tool-less fastener. It works OK, but it feels flimsy and seems out of place in a case that's otherwise very sturdy and brimming with features. All in all, that's the only flaw in an otherwise brilliant enclosure.

THERMALTAKE ARMOR JR. **9**

$115, www.thermaltake.com

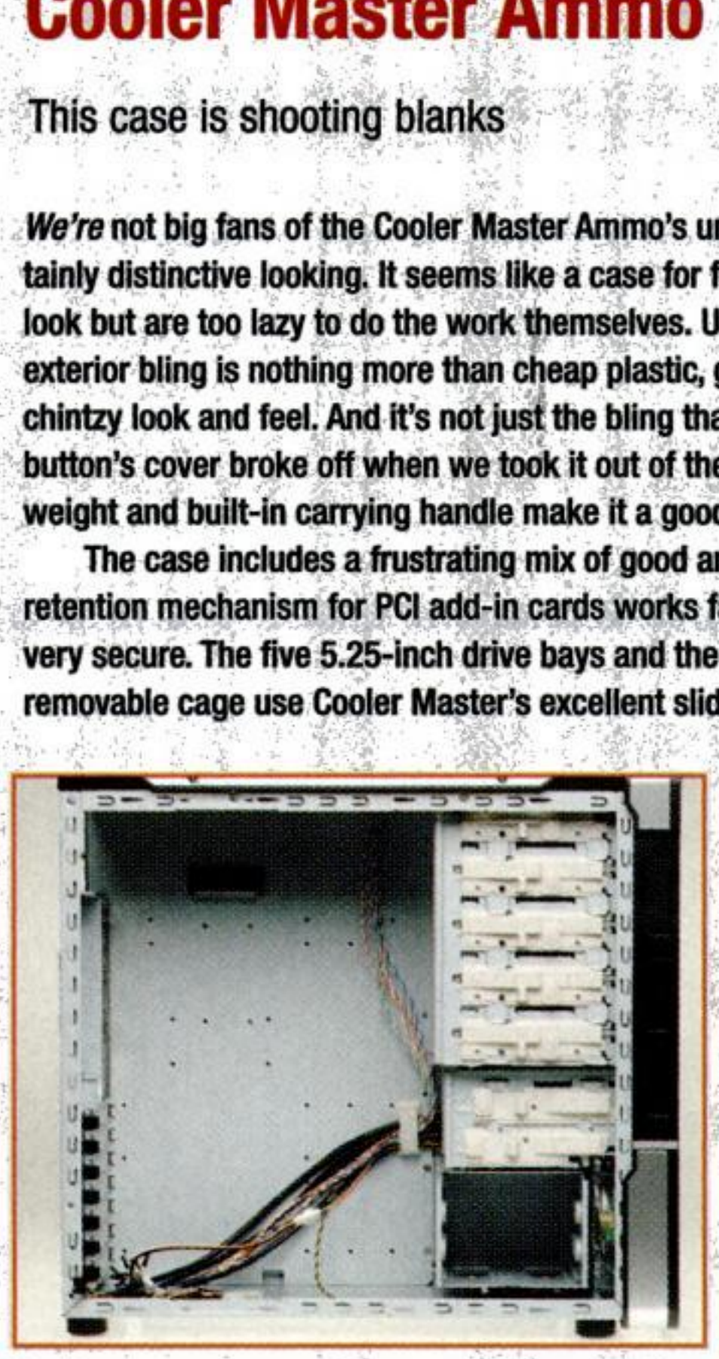
KICKASS

Cooler Master Ammo

This case is shooting blanks

We're not big fans of the Cooler Master Ammo's unique aesthetic, but it's certainly distinctive looking. It seems like a case for folks who want the "modded" look but are too lazy to do the work themselves. Unfortunately, most of the exterior bling is nothing more than cheap plastic, giving the case an extremely chintzy look and feel. And it's not just the bling that seems cheap: The Reset button's cover broke off when we took it out of the box. At least the case's light weight and built-in carrying handle make it a good LAN-party companion.

The case includes a frustrating mix of good and bad features. The tool-less retention mechanism for PCI add-in cards works fabulously, and keeps cards very secure. The five 5.25-inch drive bays and the three 3.5-inch bays in the removable cage use Cooler Master's excellent sliding-lever retention mechanism, so it's easy to swap your drives in and out. A quiet 12cm intake fan with blue LEDs blows cool air over the drives, and is oriented sideways to enable easy drive swapping.



The Ammo features a completely tool-less interior, which makes system building a breeze.

They say beauty is in the eye of the beholder, but is there anyone who doesn't think this case is fugly?

But the cooling in this case isn't trouble-free; the drive cage isn't porous, so it prevents the air from the front-mounted fan from moving beyond the hard drives. The airflow problems are compounded by the fact that the Ammo doesn't include an exhaust fan, even though there are mounts for either 8cm, 9cm, or 12cm fans. We also don't like side-mounted USB and FireWire ports; because the ports are on the right side of the case, you have to place the case to your left for easy access.

While the Ammo is not a terrible case, it misfires enough that you should pass it up.

Continued on page 49→

COOLER MASTER AMMO **7**

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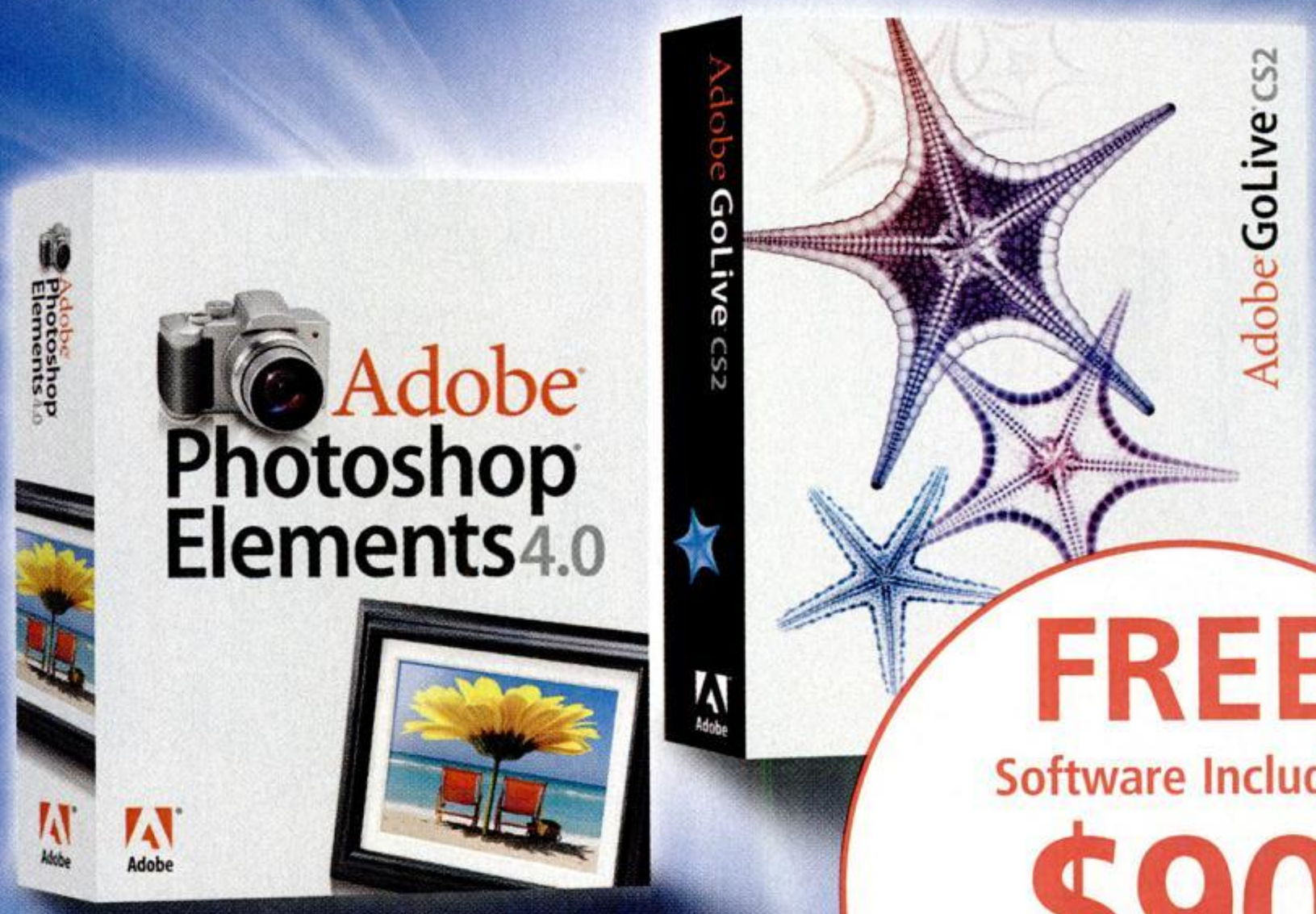

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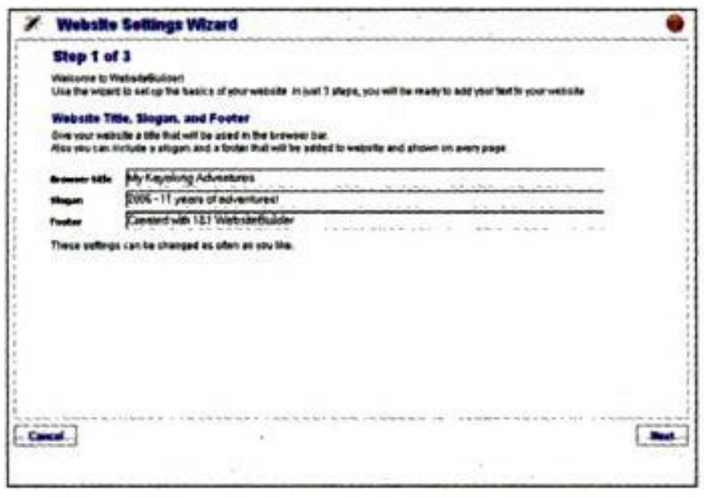

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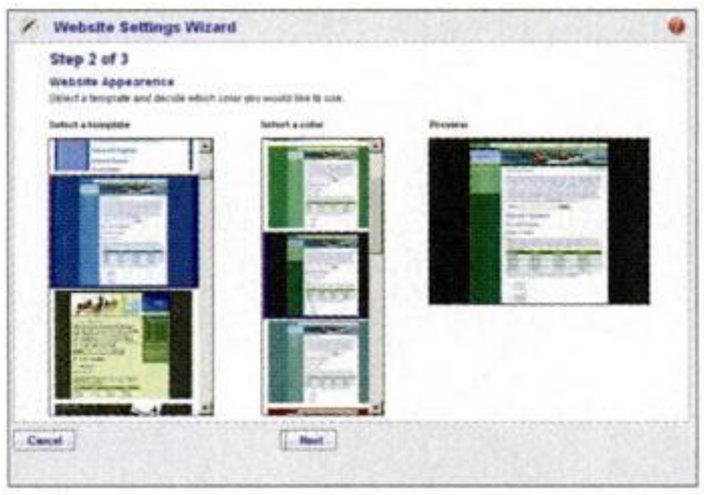

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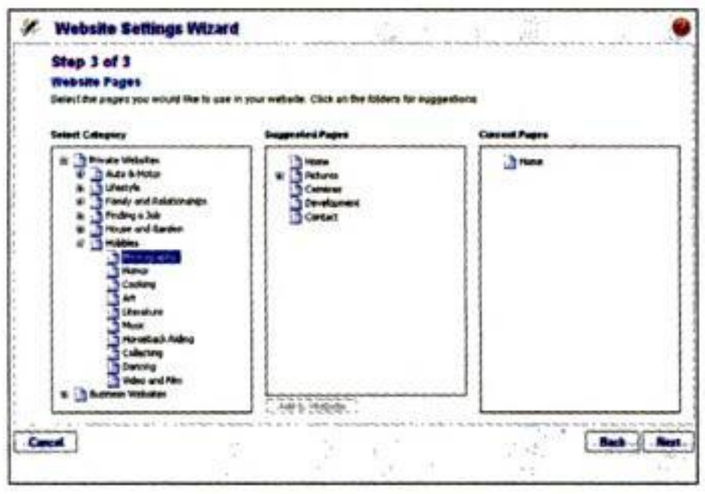

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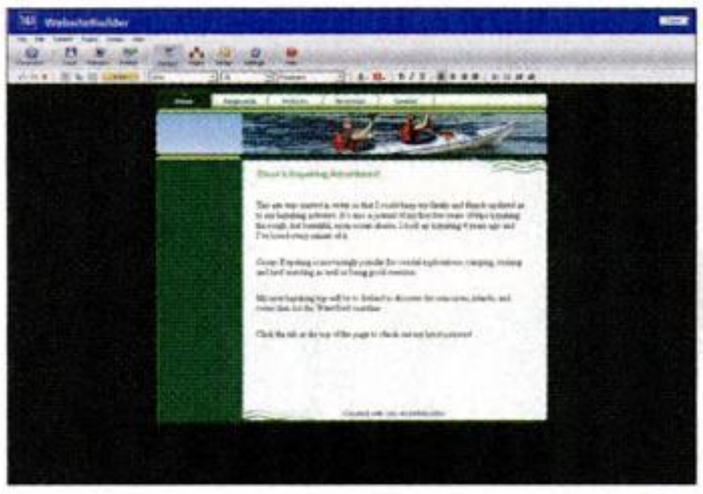

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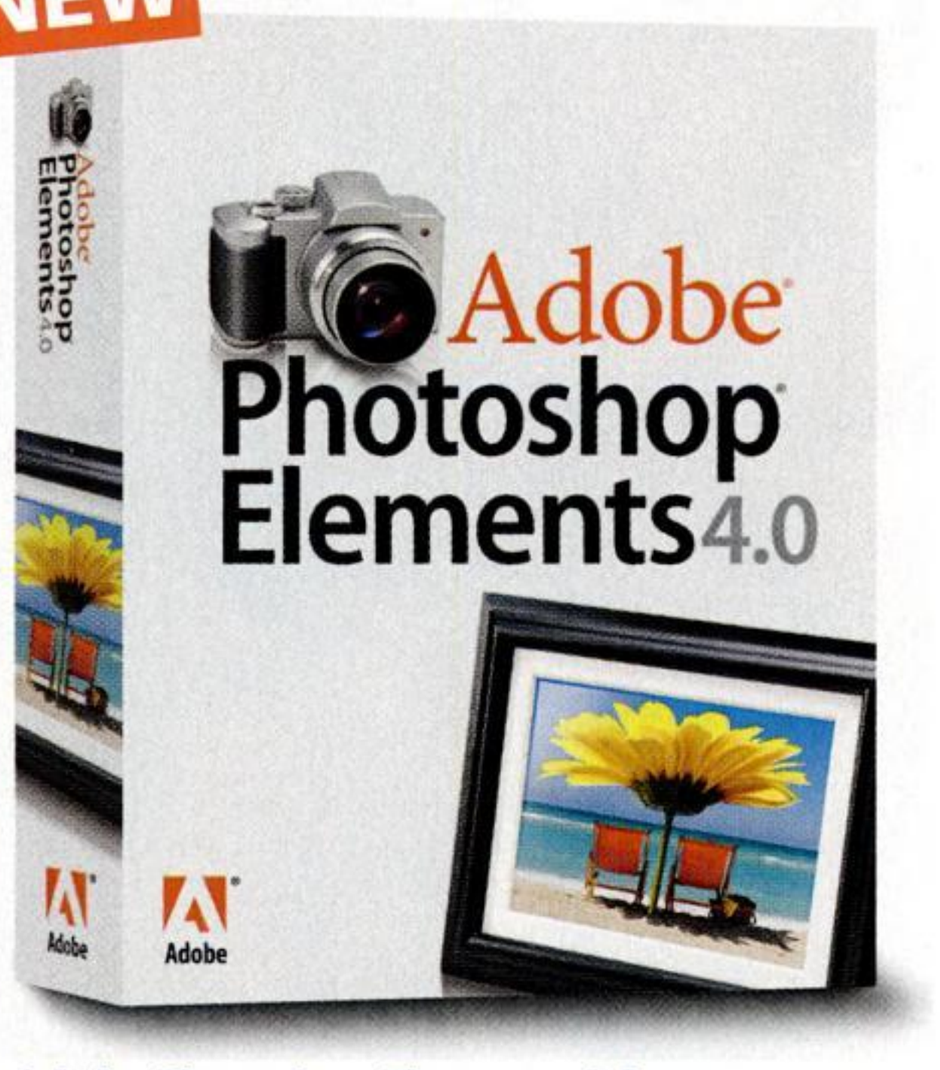

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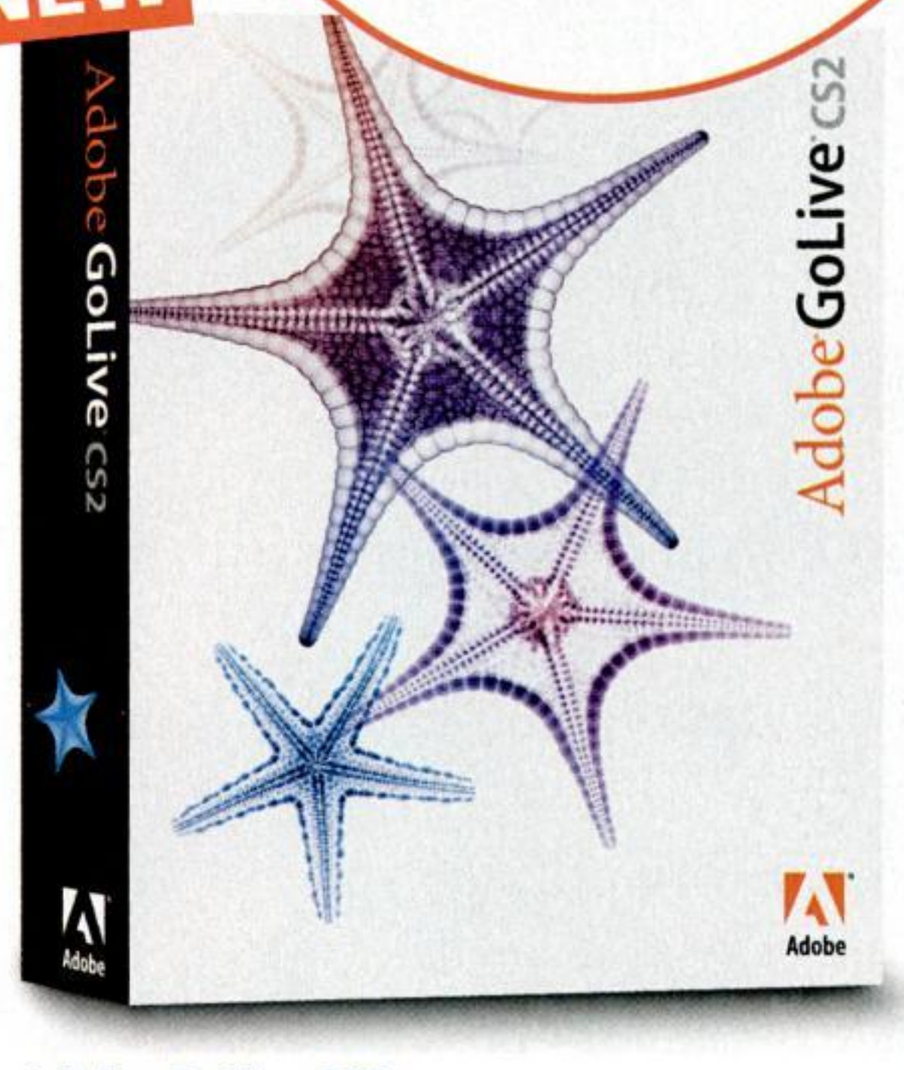

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Included Domains	1	$1.99/year with purchase
Web Space	5 GB	5 GB
Monthly Transfer Volume	250 GB	250 GB
E-mail Accounts	500 IMAP or POP3	500 POP3
Mailbox Size	2 GB	10 MB
Blog	✓	$2.99/mo. for ad-free blogs
Website Builder	8 Pages	Freeware
Photo Gallery	✓	✓
Geographic Map	✓	–
Database	10 MySQL	10 MySQL
Search Engine Tools	✓	$29.99/year additional
PHP Support	✓	✓
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Included Domains	2	1	$1.99/year with purchase
Web Space	50 GB	5 GB	50 GB
Monthly Transfer Volume	500 GB	200 GB	500 GB
E-mail Accounts	1,000 IMAP or POP3	200 POP3	1,000 POP3
Mailbox Size	2 GB	2 GB	10 MB
Blog	✓	✓	$2.99/mo. for ad-free blogs
Website Builder	12 Pages	✓	Freeware
Flash Site Builder	12 Pages	–	–
Photo Gallery	✓	✓	✓
Geographic Map	✓	✓	–
Dynamic Web Content	✓	✓	–
Web Statistics	✓	✓	✓
Chat Channels	✓	–	✓
Database	25 MySQL	MySQL Support	25 MySQL
Search Engine Tools	✓	Extra Charge Applies	$29.99/year additional
PHP Support	✓	✓	✓
Perl Support	✓	✓	✓
Starter Software Suite	✓	–	–
90-Day Money Back Guarantee	✓	–	–
Support	24/7 Toll-free Phone, E-mail	24/7 Toll-free Phone, E-mail	24/7 Phone, E-mail

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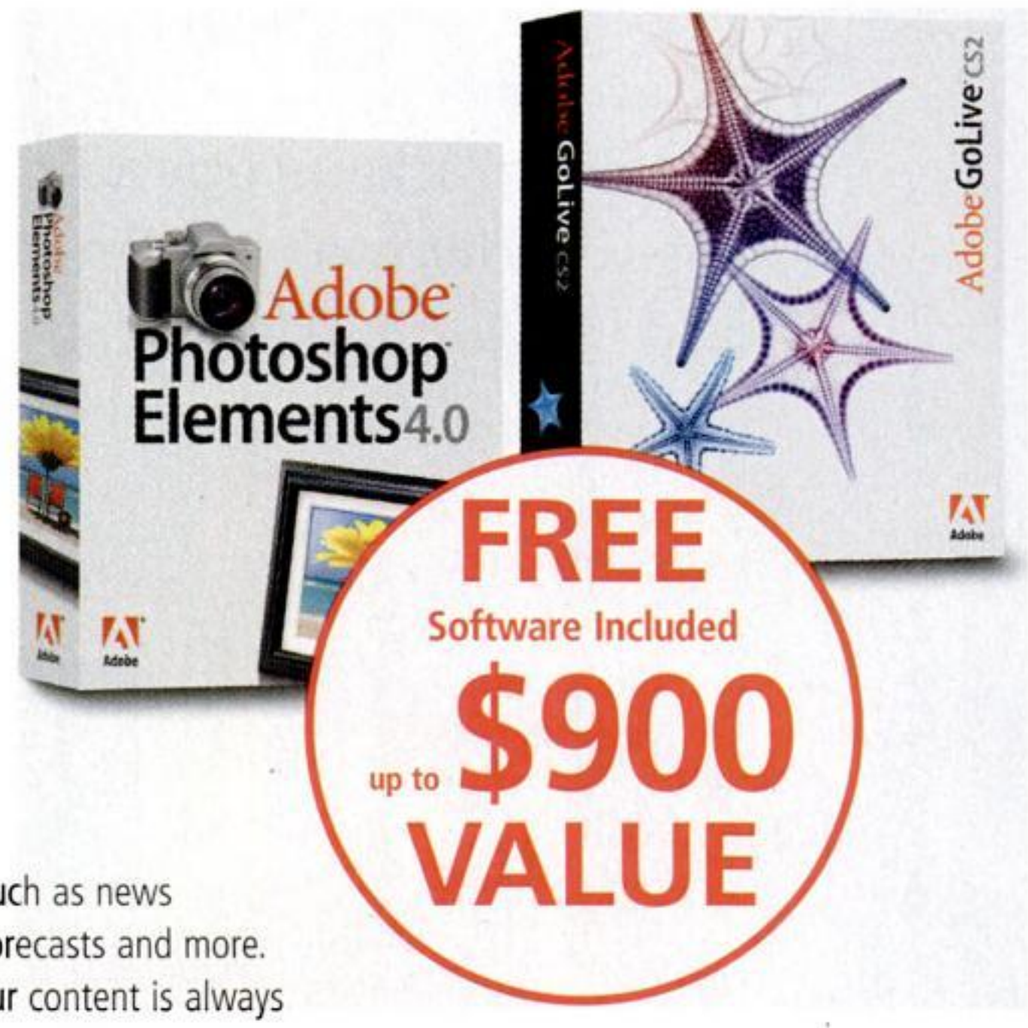

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Build and maintain a relationship with your visitors via e-mail newsletters and our Newsletter Tool, now updated with 10 new templates. Create and send professional-looking e-mails – easily and with no programming hassles! Build your own mailing lists, manage recipients' addresses, track results and more.

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Analyze your website's performance!

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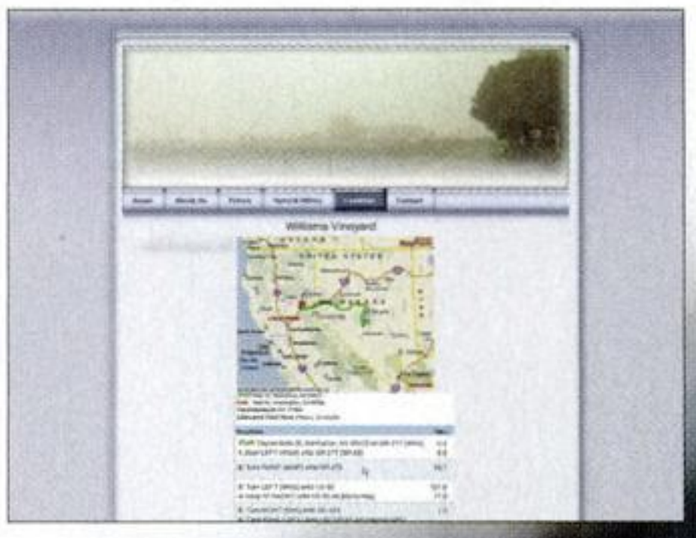
Offer convenient directions for your customers!

Make sure your audience knows how to find you. With this handy tool, you'll provide your customers with accurate driving directions and detailed geographic maps. Easily integrated into any website, you can add this important resource in a few simple steps.



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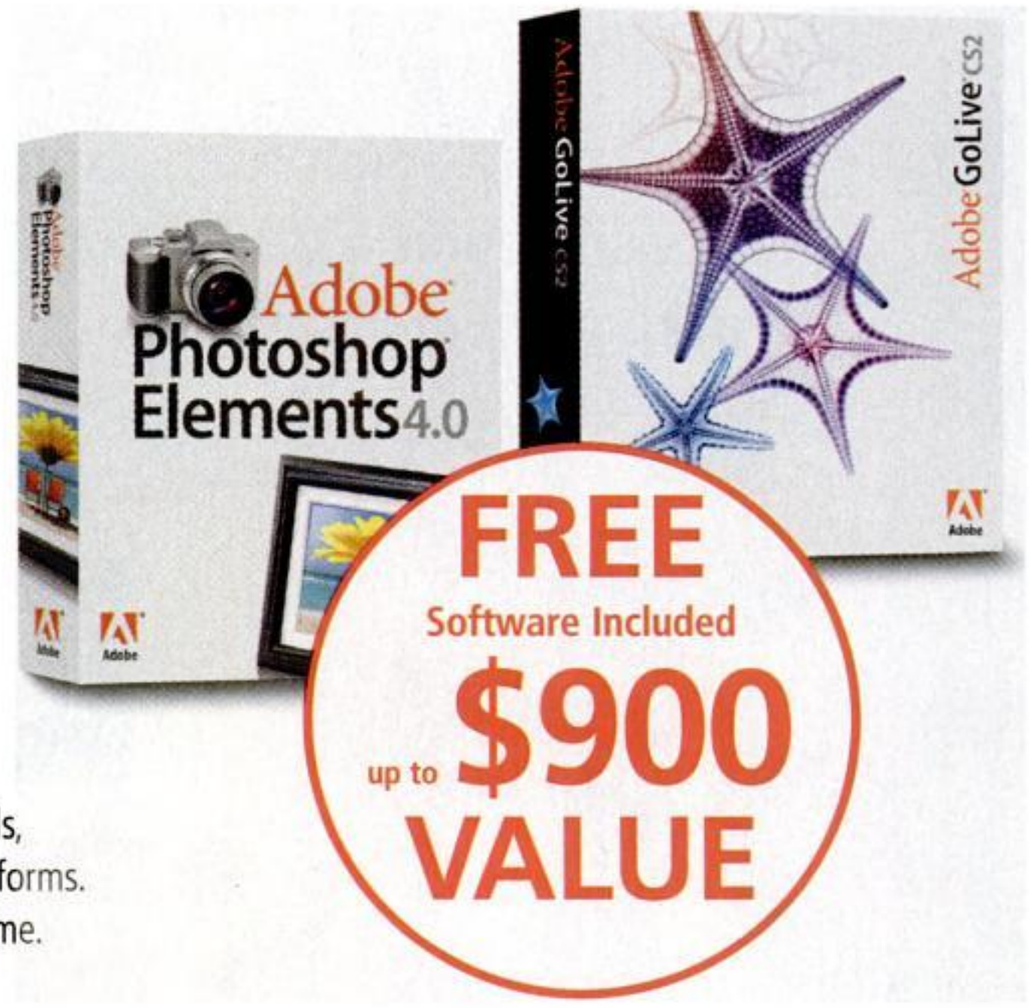

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E-mail Accounts	3,000 IMAP or POP3	1,000 POP3
Mailbox Size	2 GB	2 GB
Blog	✓	✓
Website Builder	25 Pages	✓
Flash Site Builder	25 Pages	–
Photo Gallery	✓	✓
Geographic Map	✓	✓
Driving Directions	✓	✓
Dynamic Web Content	✓	✓
Web Statistics	✓	✓
E-mail Newsletter Tool	✓	$10/month
In2site Live Dialogue	✓	–
Chat Channels	✓	–
Form Builder	✓	✓
Database	100 MySQL	MySQL Support
Search Engine Tools	✓	Extra Charge Applies
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Perl Support	✓	✓
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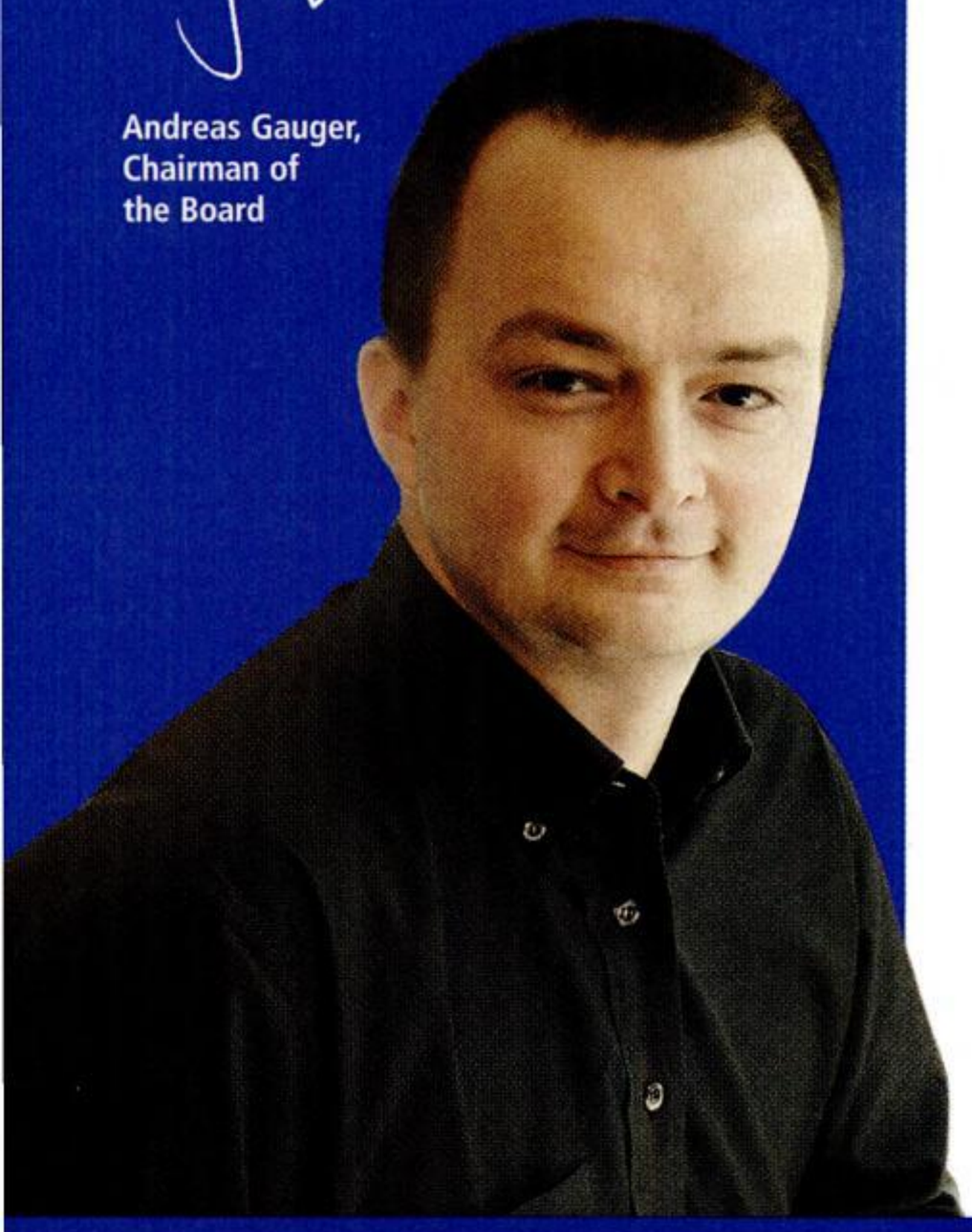
Andreas Gauger,
Chairman of
the Board



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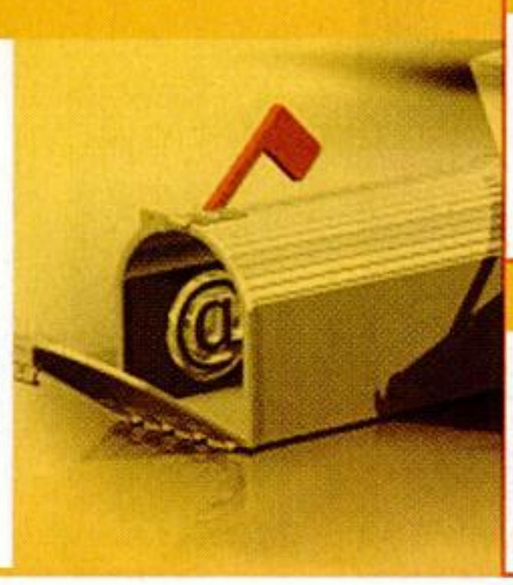

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Continued from page 48

Titan Robela

Built-in water-cooling sinks this ship

We *love* the concept behind this case: built into the case door is a water-cooling kit that attaches to both the CPU and the videocard. Huge 12cm fans blow hot air out through the massive door-size radiator while cooling the components at the same time. In theory, it should work wonderfully. In practice, however, this is a poor design fraught with flaws.

The water-cooling kit is exactly the same as the Kingwin Aquastar (reviewed December 2005), which isn't a bad thing, but is definitely a mid- to low-end setup with a cheap look and feel. When we opened the case for the first time, we discovered that Titan shipped the kit with water in it (Titan tells us that the case will not normally ship prefilled). Because one of the little rubber stoppers on the reservoir had popped out, there was water on the floor of the case and door when we received it.

The directions for installing the water-cooling kit were very clear, but they were incomplete. There are no instructions describing how to attach either the CPU or GPU water blocks, so you have to fend for yourself. Luckily, it's not that tough to figure out—the Aquastar is one of the easier kits we've set up. Still, you don't want to be guessing about something as sensitive as water-cooling, so incomplete instructions are a mortal sin.

Another problem stems from the fact that the case door is permanently tethered to the case via the cables for the built-in cooling apparatus. Essentially, someone has to hold the door for you while you lay the case down on its side to install the CPU block—an extremely awkward proposition. Installing the GPU block is easier, but, again, a lack of instructions requires you to guess which of the three possible retention mechanisms you should use.

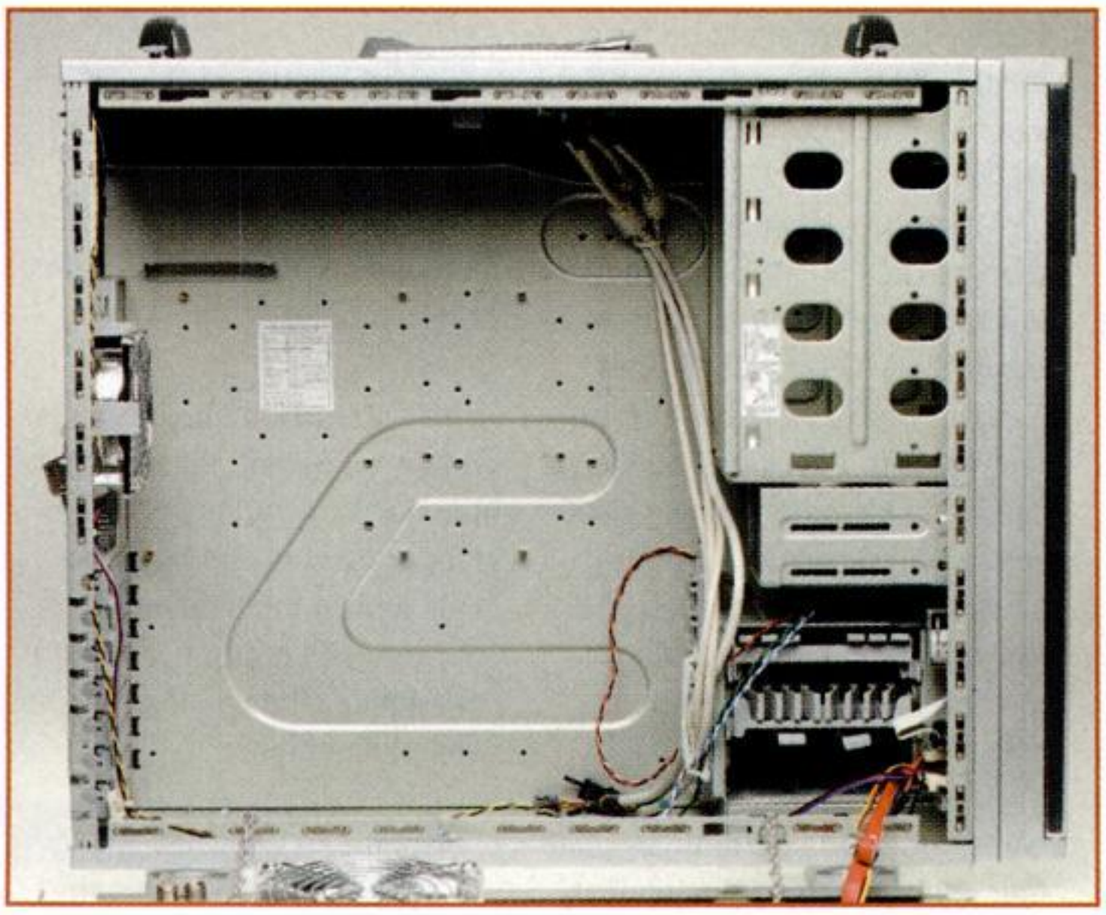
Once we had the blocks installed and were ready to fire up the rig, we ran into another silly issue. The top part of the case door houses the system's pump, which is a large, plastic block. When we first tried to close the door, the pump was bumping up against our slightly longer-than-normal power supply, so we couldn't close the case door. We installed a shorter, Antec TruePower 550W, which almost fit, but the cables hit the pump this time. Agitated, we grabbed a third PSU from PC Power and Cooling, which fit perfectly. All this trial and error could have been mitigated if Titan had just moved the pump about a half-inch.

Once finally up and running, we found the Robela to be a quiet case. Temps were decent with the water-cooling, but still on par with a good aftermarket heatsink/fan. An LCD display graces the case's front bezel, but the numbers are too close together to read at a glance.

Water-cooling aside, the case is a massive full-size steel tower. Judged by itself, it would be an acceptable enclosure, although its looks are decidedly cheesy. It's sturdy, and spacious enough to hold all your hardware, with room to spare. Drives attach via rails, the I/O ports are top-mounted, and the front bezel locks shut. You have to open the bezel door to power up the system, but at least the door offers protection from accidental button presses. Airflow through the case is poor—there's no intake fan, though there is a filter for one—and the chromed 12cm fan in back can't move enough air around the CPU. Most of the air is sucked out of the case by the dual 12cm fans cooling the door-mounted radiator.

We applaud Titan for its bold cooling concept, and certainly appreciate the potential—we just think the company needs to spend a little more time at the drawing board.

The Titan Robela has a hate-it or really hate-it exterior, at least among our staff. Even our photographer sneered at its plastic faux chrome.



The Robela's built-in water-cooling kit works quite well once it's up and running, cooling both the CPU and GPU very quietly.

TITAN ROBELA

5

$400, www.inland-products.com

Cooler Master Mystique

The Mystique lacks that special something that stoked our love affair with the classic Wave Master.

The Mystique is the spiritual successor to the fabulous Wave Master, at least aesthetically. This case covers all the important bases, but it lacks the special spark that made its predecessor a legend.

The tool-less design features a swinging front-bezel door that can be configured to open either to the left or right, which is handy. Below the door is a quiet, 12cm, blue LED intake fan with a washable filter—neat freaks, rejoice! Combined with the 12cm exhaust fan, the Mystique ships with plenty of cooling power. The top of the case houses easy-to-access I/O ports, and there are four 5.25-inch drive bays that use Cooler Master's excellent drive-rail system. Inside you'll find a cage that holds four hard drives, using excellent snap-in rails. We love the sideways orientation of the cage, since it makes drive swaps easy. And—surprise, surprise—Cooler Master includes two holes in the top of the case to make it easy to add an external radiator.

The only real problem with the case is the expansion-card locking mechanism. A single locking bar clamps all of the cards in place. Sounds good, right? Wrong! Opening the bar frees every card in your case, so getting it cinched back down can be a hassle.

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Luxor Pyramid

We built a computer into this ungodly abomination of an enclosure so you wouldn't have to. No, don't thank us.

We know what you're thinking: Oh my god, how cool! This case is not cool. The Luxor is possibly the worst-designed case we've ever had the misfortune to test.

The problem, as you might have guessed, is space, or lack thereof. The PSU goes in the very bottom, with the motherboard on top of it. Just squeezing the removable motherboard tray into its slots is a chore, because it kept bumping into the PSU below. We had to exert tremendous force (something we usually discourage) to get the mobo tray in place. And once we got it in, the fit was so tight that Senior Editor Ung predicted that the mobo would be permanently entombed. There's also limited clearance above the mobo, so we couldn't use the stock AMD cooler that came with our CPU. Water-cooling in this case? Ha, that's rich.

Not surprisingly, removing components from this case is just as difficult as installing them. Take our advice: Don't fall for this pyramid scheme!

LUXOR PYRAMID **1**

$290, www.silverpcs.com

Silverstone TJ08

The TJ08 is just a bit smaller than an ATX mid-tower, but we'd rather have a mid-tower and avoid this case's headaches.

The TJ08 is the first case we've ever seen from Silverstone that we haven't instantly fallen in love with. Here's why: It's a micro-ATX tower. Say what? Yes, it's a mid-tower that holds a teeny, tiny micro-ATX mobo, which begs the question: If you want a tower, why not just go with a larger, roomier ATX model? And if you want micro-ATX, why not build in a more petite, quieter enclosure? This case is just a bit too small for a mid-tower, but too big for a small formfactor.

Of course, the case is typical Silverstone—gorgeous and impeccably crafted. The brushed-aluminum exterior is exquisite to behold, and the inclusion of two 12cm fans is a revelation in such a small enclosure. It's *very* cramped inside, however. The compact design requires you to install your hardware in a specific order, which is par for the course with micro-ATX designs. Thankfully, the motherboard tray is removable.

The dual 12cm fans provide massive cooling, and the TJ08 accommodates a standard ATX power supply. Regardless, this case is way too skimpy for a power-user config. If you want micro-ATX, just buy a small formfactor.

SILVERSTONE TJ08 **7**

$100, www.silverstonetek.com

Lian Li PC-V600A

Finally, an affordable Lian Li case! Pity it's so damn small.

Aww, look at the little Lian Li. It's so cute. If a standard mid-tower is too big, or the rest of Lian Li's lineup is too expensive, this case could do you right. Though we found it a wee bit crowded for our tastes, it's an excellent rig for a modest PC configuration. And it's very quiet and easy to build in, as well.

There's one big problem, though: The PSU slots in along the bottom of the case, over the top of the CPU area, so big-ass coolers (which we're big fans of) are verboten. This case could be a candidate for water-cooling since a water-block would consume almost no space around the CPU socket, but routing the tubing through the tight confines of the chassis would be a bitch.

The interior has space enough for three hard drives and four 5.25-inch drives, as well as a full-size ATX mobo, which is totally sufficient. Plus it offers the quiet operation and excellent craftsmanship that Lian Li is known for. Indeed, this is an excellent mini-me rig. More ambitious configs, however, need something bigger.

LIAN LI PC-V600A **8**

$125, www.silverpcs.com

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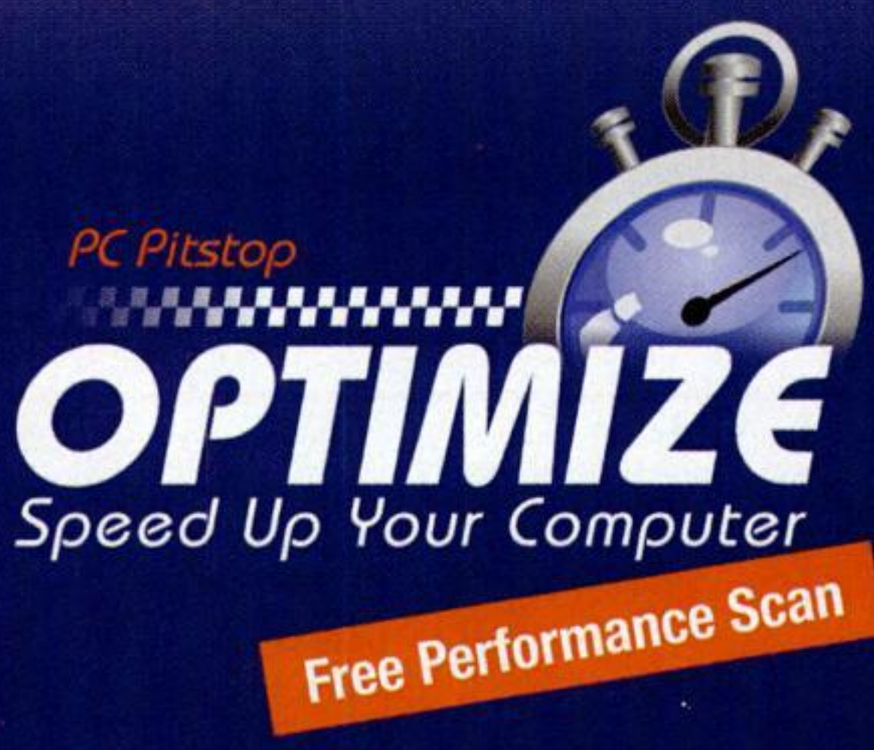

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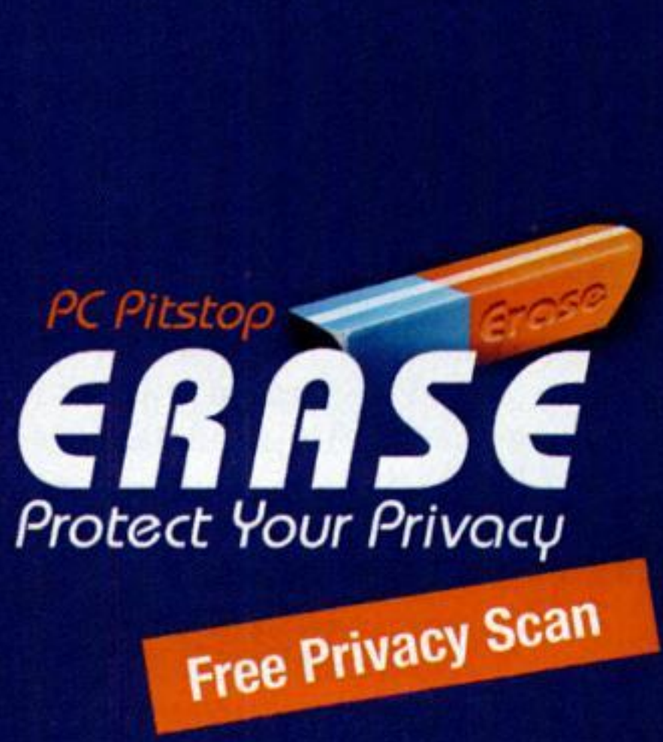

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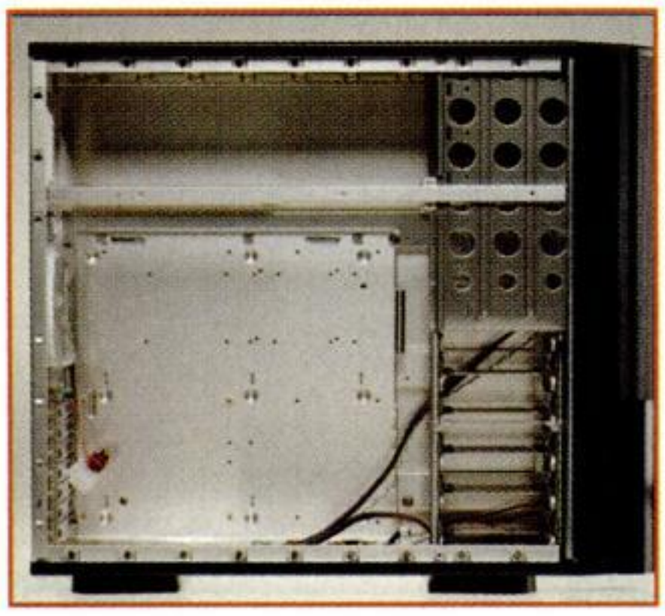
Thermaltake Eureka

There's no such thing as a case that is too big

Thermaltake calls the Eureka a "speaker design." Whatever it is, we like it.

Holy schnikes, this is one mammoth case. Labeled a "home server" case by Thermaltake, the Eureka is one of the largest cases we've ever tested. It's also one of the lightest, thanks to its all-aluminum construction, yet it's plenty sturdy and rugged. While we found it a dream to build in this case, it's missing a certain *je ne sais qua* that would have us drawing pictures of it on our notebooks during Algebra.

The Eureka's massive concave bezel is just for show: Swing it open and it's an empty shell, covering five 5.25-inch drive bays and two 3.5-inch bays. Optical drives are installed via screw-on rails. Hard drives mount to a tray via screws, which you then slide into a rail system. You can install a total of five hard drives, more than enough for even a power user, and we love the included rubber grommets, which keep the drives nice and quiet. A quiet 12cm fan blows air over the sideways-facing hard drive cage.



The Eureka is billed as a server tower, and as such can easily accommodate both regular ATX and Extended ATX mobos.

As we'd expect from a case this large, cooling is exemplary. A second 12cm blue LED fan handles exhaust duties (and honeycomb air vents in the case door allow you to even see the glow when the system is up and running). The case comes precut for an external radiator; there are even two holes in the upper chassis to make running tubes simple (we like this trend!). There's plenty of room for oversized PSUs, so that 1-kilowatt jobbie will fit just fine. There's also a removable motherboard tray, which is a scarcity these days. Sadly, the I/O ports are on the right-side of the case, making them difficult to access unless the case is on your left.

We dig this case's solid chassis, and its design will certainly accommodate your hardware, but it falls just shy of greatness.

THERMALTAKE EUREKA **9**

$190, www.thermaltake.com

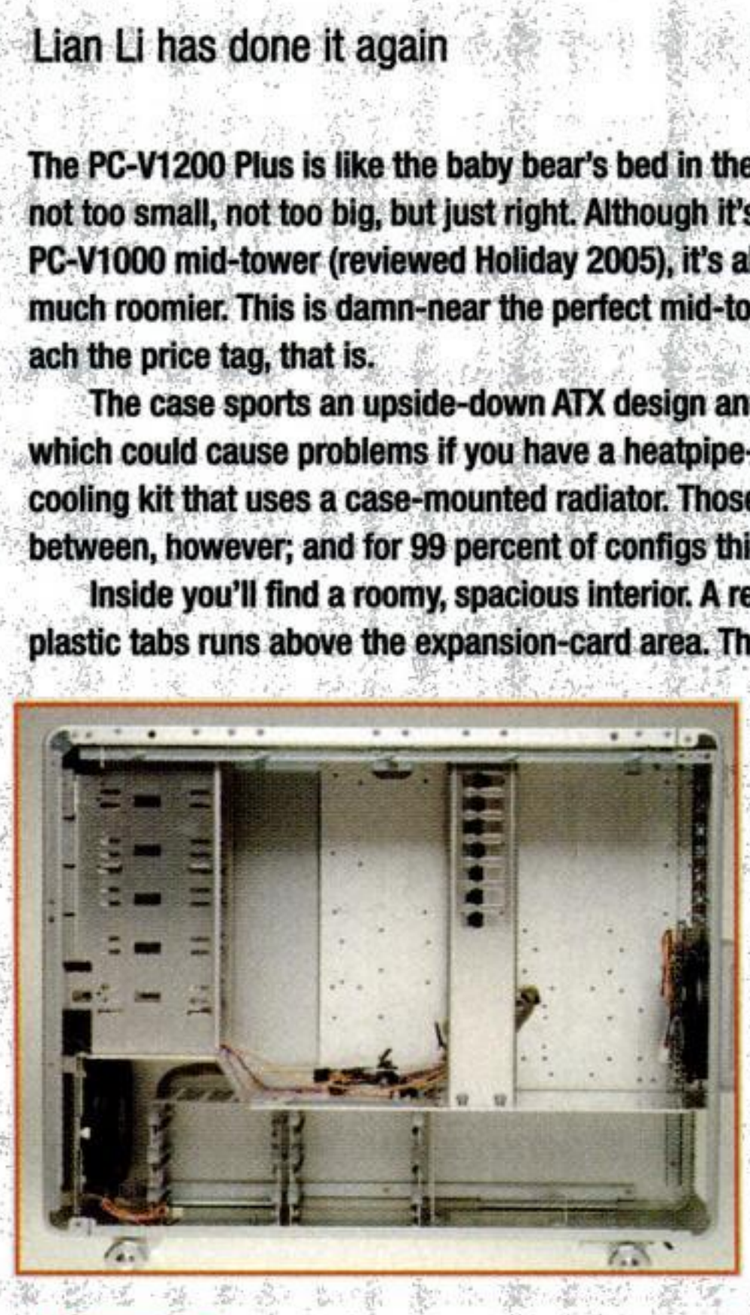
Lian Li PC V-1200 Plus

Lian Li has done it again

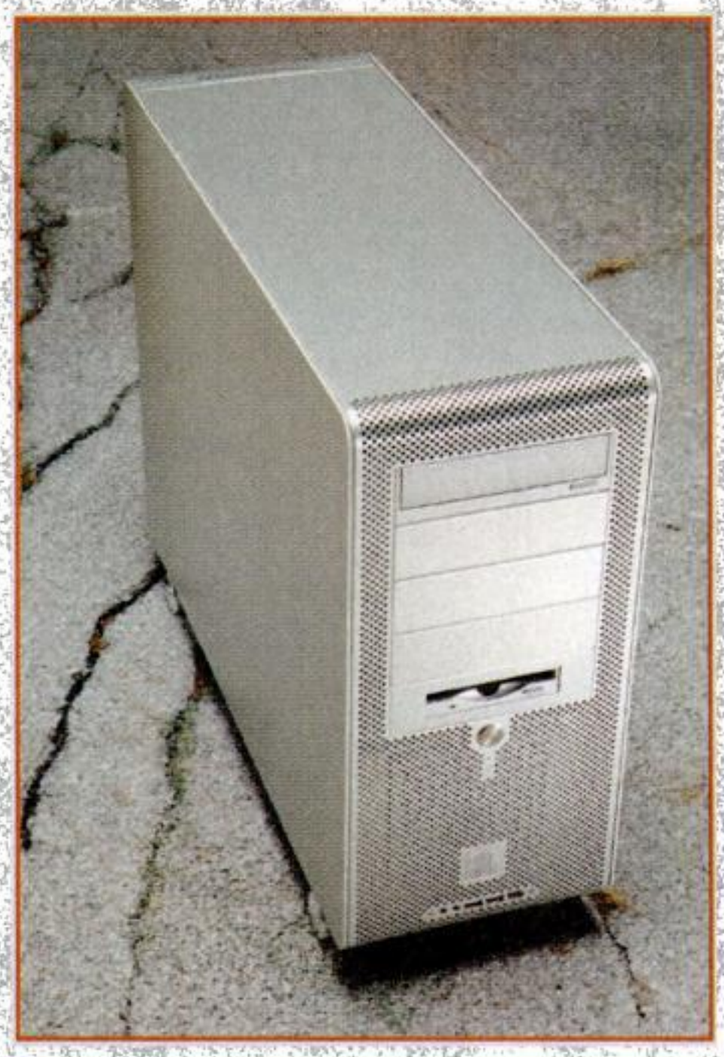
The PC-V1200 Plus is like the baby bear's bed in the *Three Little Bears*: It's not too small, not too big, but just right. Although it's the same height as the PC-V1000 mid-tower (reviewed Holiday 2005), it's about four inches longer and much roomier. This is damn-near the perfect mid-tower case—if you can stomach the price tag, that is.

The case sports an upside-down ATX design and opens on the right side, which could cause problems if you have a heatpipe-cooled chipset or a water-cooling kit that uses a case-mounted radiator. Those scenarios are few and far between, however; and for 99 percent of configs this design work perfectly.

Inside you'll find a roomy, spacious interior. A removable bar fitted with plastic tabs runs above the expansion-card area. The bar will keep your expansion cards from popping out, even if the rig travels long distances. The hard drives and PSU are in a separate chamber at the bottom of the case, which isolates them from the rest of your components. There's even room for super-long ATX power supplies, which are necessary for some dual-videocard rigs.



Having the hard drives and PSU in a separate chamber with their own fan provides better airflow than the standard ATX design.



We call these three-quarter views "beauty shots," and in this case it's a literal description. The PC-V1200 is one gorgeous case.

There are two three-drive bays for hard drives, which are each cooled by a silent 12cm fan. The only thing we don't love about the PC-1200 is Lian Li's hard drive installation mechanism. You attach screws to the drives, which act as rails. Then you push the drive into slots on the rack, and lock down a tab to secure it. This design amplifies drive noise, but it's very easy to use and secures the drives well.

LIAN LI PC-V1200 PLUS **9**

$225, www.silverpcs.com

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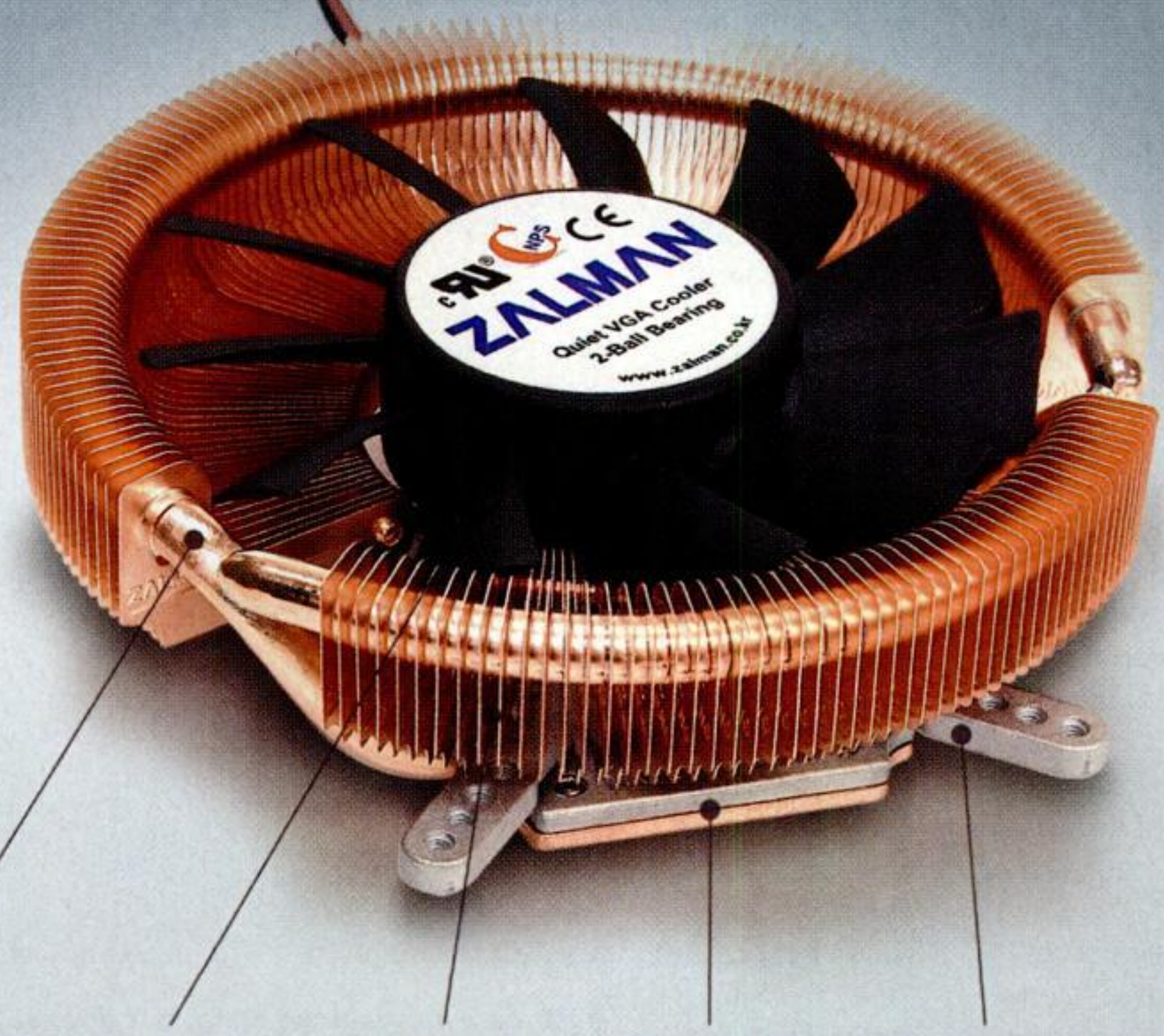

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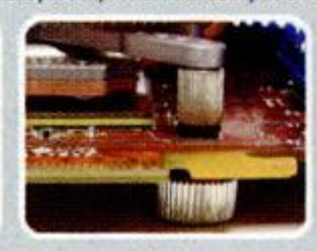

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FrozenCPU HyperCube

A killer case that's definitely not 'square'

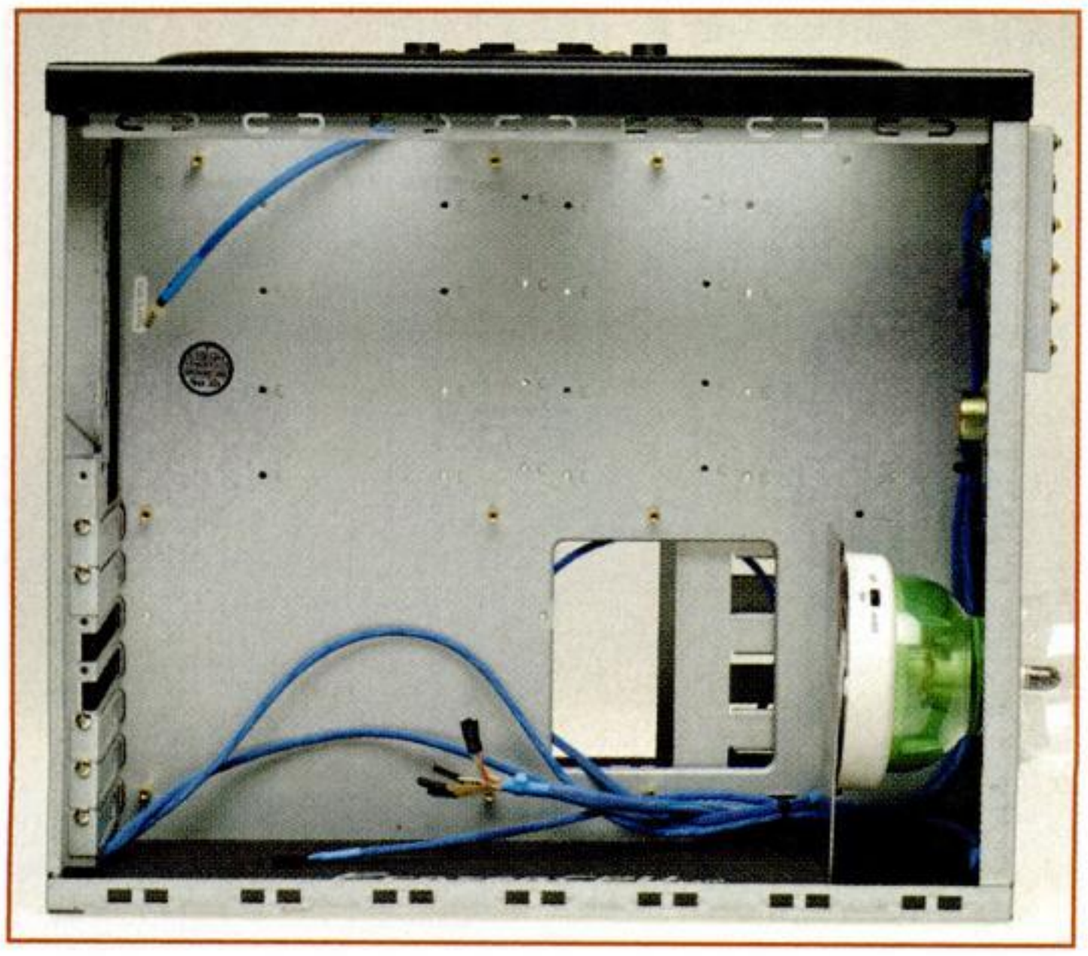
Your case might have bling, but does it have a plasma ball? The HyperCube does.

The HyperCube is one of the coolest cases we've ever tested, both literally and figuratively. It's a design that's been around for awhile, but online retailer Frozencpu.com has improved it in every way possible with extensive modifications.

Like the Lian Li cases in this roundup, the HyperCube's interior is divided into two partitions. One partition houses the mobo and add-in cards, and the other holds the power supply, optical drives, and hard drives. It's a clever way to arrange components, because it allows independent cooling of each section, which is far more effective than blowing air into the case and hoping it cools everything. It also keeps the noisy drives separated from the rest of the components, cutting down on overall system din. All told, this is a very quiet case (with the fans turned down, that is), which is largely the result of the acoustic damping material that lines the floor of both partitions.

The interior of the case is like two SFF cases glued together. Each half is a little small, but only has to hold half the normal hardware, so it works out OK. The left half houses the case's flashiest component: the plasma ball. Yes, that little ball in the corner is one of those Spencer's Gifts-style lightning balls. When you touch it, the rays go to your finger. You can turn it off, leave it running, or have it light up according to audio pulses. The audio setting, however, isn't sensitive enough to respond to music or games; it only fired when we clapped our hands in front of it. The plasma ball is the very definition of "useless, but cool."

Other add-ons are more useful; the windows on the sides and top of the case and four blue LED fans are great. FrozenCPU mounted a custom fanbus on the top of the case to make fan control a cinch, and it's one of the best we've ever tested. Every fan has a status LED, so when the fan is on but not spinning the LED glows red; once the fan is active, the light shifts to blue. Increasing a fan's speed increases the LED's brightness. With all four fans at full-blast the case is loud and bright, but you can turn all the fans (and lights) completely off. We also love how the wires from all the fans are discretely routed through the case interior up to the fanbus, in order to keep the inside tidy. Our only complaint with the fanbus is that it hangs down between the drive bays, blocking several of the 3.5-inch drives and 5.25-inch drives. But with 13 drive bays total, this is a minor issue.



The interior is divided into two compartments: one for the mobo and add-in cards, and the other for optical and magnetic drives.

Installation of our parts was very easy. We mounted the mobo/videocard in the left half, and our drives in the right half. We then snaked the SATA and PATA cables through, along with the power cables, and were ready to rumble in no time. Routing cables from the drive side of the case to the mobo side is a little tricky because the hole between sides is quite small. With just a few cables it's no big thing, but if you have more than a couple of PATA drives, you'll have to use some elbow grease to get the cables to their respective ports. Also, you have to remove four screws to detach each hard drive cage, which is a little extreme. There are four cages total, each capable of holding two drives. There are also five 5.25-inch bays.

This case is incredibly expensive at $400, but considering how much craftsmanship went into making it, the price tag is not surprising.

FROZENCPU HYPERCUBE **9**

$400, www.frozencpu.com

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Ready to Sign on the Dotted Line?

We've looked at a lot of fine cases here, and some that were not so fine. So now that it's just you and *Maximum PC* in the sales office, let's cut the crap and choose a winner from each price category

Less than $150

The clear winner in this category is the Thermaltake Armor Jr. It's a pint-size performance champ that can hold oodles of hardware and cool it all with ease; plus it looks really classy. We love the Raptor X window, the extra bay specifically designed for a water-cooling reservoir, and the case's rugged construction. For the price, there's no finer mid-tower, and it's available in silver or black, with or without a window, and it's BTX-compatible. That's a ton of options.

The runner-up is the less sexy Cooler Master Mystique, which is plenty capable but missing the nice touches of the Armor Jr. Cooler Master has gotten rather complacent with its case designs as of late, while Thermaltake and Antec have continually fielded fresh and innovative designs. We hope that CM, which blew away the PC enthusiast crowd several years ago with its all-aluminum beauties, finds its mojo again.

More than $150

There's a clear winner in this category, as well: the Lian Li PC-V1200 Plus. To say this case is sexy as hell is putting it mildly. More importantly you don't need to make any sacrifices to get the good looks. The PC-V1200 is easy to work in, has plenty of room for even the most insane configs, and delivers ample stock cooling, all while running whisper quiet.

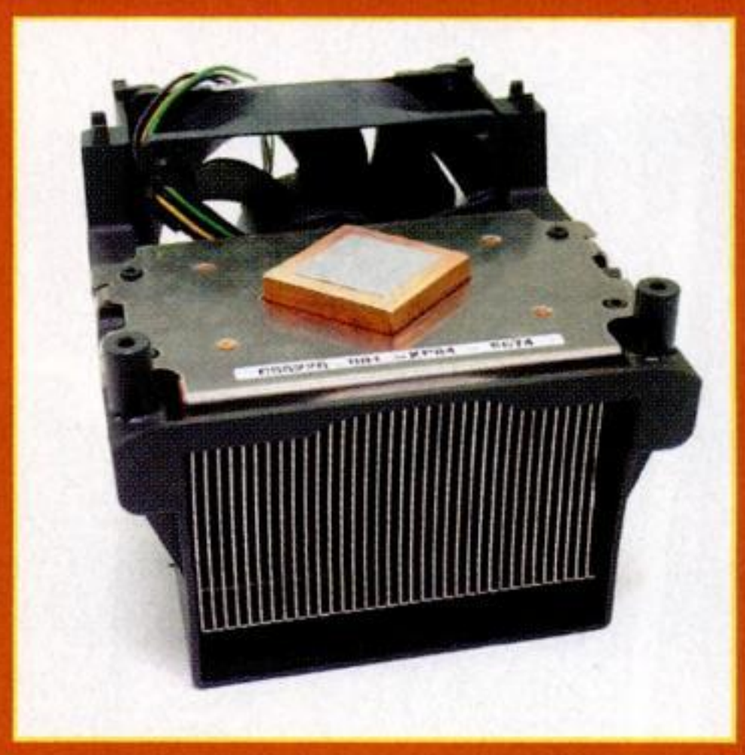
Going into this grudge match, we thought the FrozenCPU HyperCube would take the "money is no object" title, with its dazzling lights and custom fanbus. But in the end, elegance and simplicity won out over bling and unique styling. The Lian Li is just easier to work in and easier to live with. Ironically, the HyperCube is the polar opposite of the Lian Li, but that's why we like it: It's totally outrageous and audacious. It screams "Maximum PC," whereas the Lian Li whispers it in a sexy voice. MPC

What Happened to BTX?

Back in 2004, we assumed that Intel's BTX formfactor would dominate ATX by now. We were wrong. The BTX formfactor was designed to increase cooling and provide faster communication between the chipset and CPU, which sounds great, but here's the problem: System manufacturers are still happy with ATX. BTX has received a lukewarm response in the retail sector, and is now on life support. Though Dell and Gateway are offering some BTX desktop configs, the case manufacturers we talked to said they don't see a bright future for the stillborn formfactor.

"Since the introduction of the BTX formfactor in 2004, there has not been a great deal of growth," said Annie Wu of Thermaltake, who added that the company will support the design via modification plates "as long as there is demand." Cooler Master was more direct. "Cooler Master will not put any more resources into the BTX formfactor, unless the market changes in the future," said spokesperson Yolanda Wan. She added, "We don't think BTX will replace ATX."

As it stands, you'd be wise to steer clear of a BTX system, especially if you're looking to upgrade down the road. And with the recent move toward low-wattage CPUs from both Intel and AMD, BTX's importance will only diminish in the days and years ahead.



The BTX formfactor might go the way of the dodo bird. Its thermal module (above) is massive and unwieldy.

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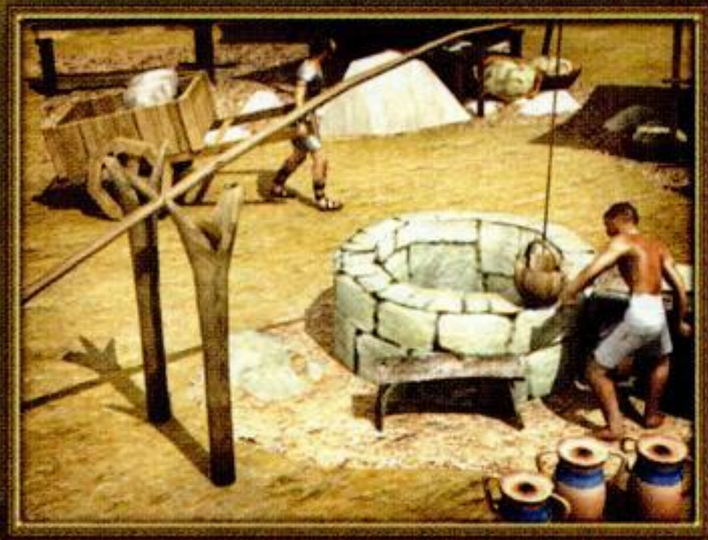

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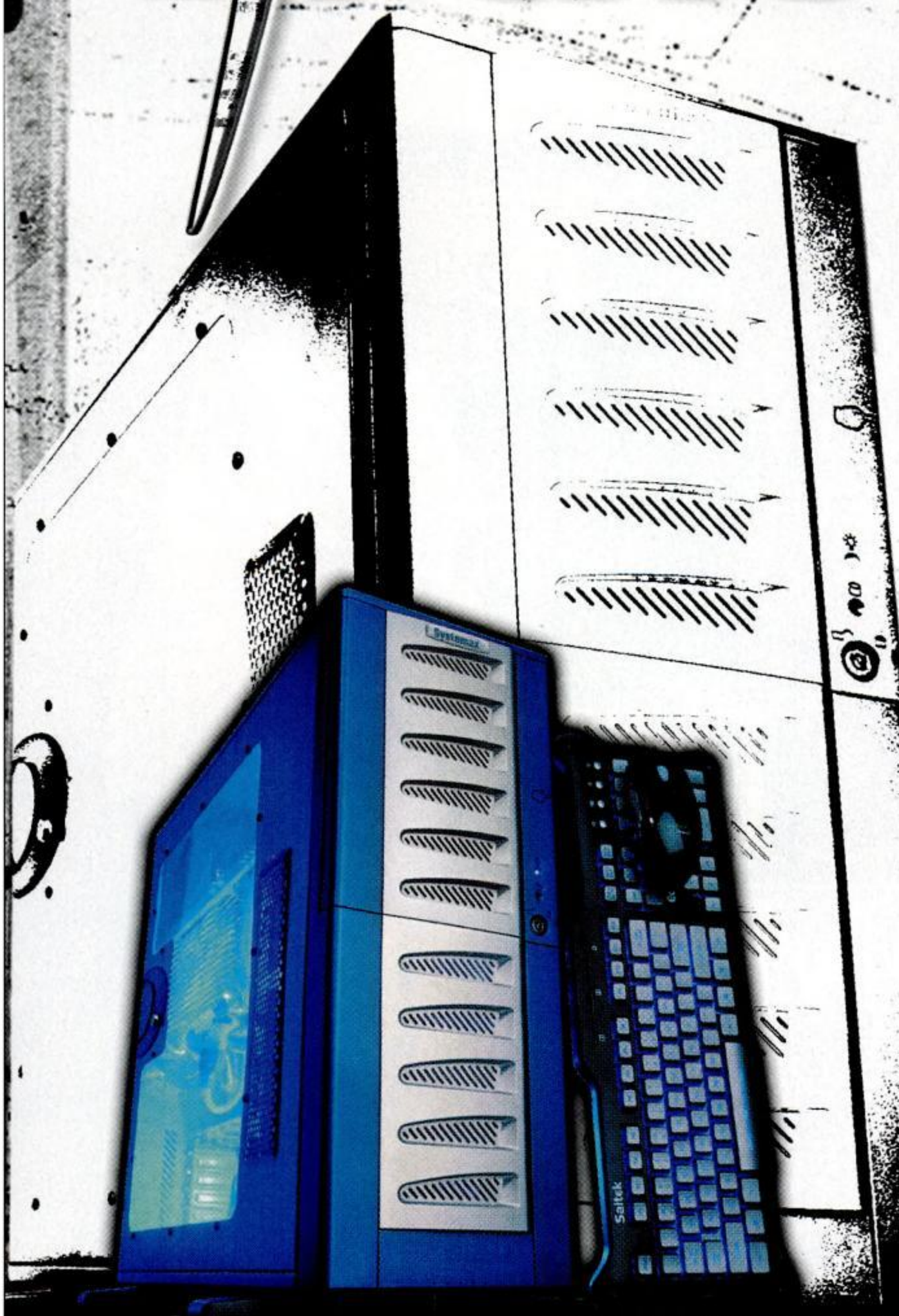

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BY WILL **SMITH**

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- **A WEB SERVER RUNNING APACHE AND PHP**
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- **BROADCAST MACHINE**
  Free, www.getdemocracy.com/broadcast
- **A FTP CLIENT**
  Free, http://filezilla.sourceforge.net
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1 Examining the Main Screen

The trickiest part of the entire process is getting your web host configured to work with *Broadcast Machine*. If you can upload files to your website using FTP, and your host uses Apache web servers on Linux, it will almost certainly work. For the purposes of this how-to, we used Dreamhost (**www.dreamhost.com**), which worked fine when we applied one minor tweak. If your website is hosted by a less functional service—such as Blogger, Typepad, or Myspace—you're probably out of luck.

Broadcast Machine's torrent tracker won't run if a certain Apache module (mod_security) is loaded. Luckily, with Dreamhost, we can create a subdomain (in this case, video.willski.com), where we'll disable mod_security, while leaving the rest of our site protected.

To disable mod_security, go to your Dreamhost control panel (http://panel.dreamhost.com), and click the Domains tab. Then click Manage Domains, and click Add New Domain/Sub-Domain at the bottom of the page. Then, fill in the domain you want to host—we chose video.willski.com—make sure that the PHP version is set to 4.4.2, and Extra Web Security is unchecked; then click "Fully host this domain now!"

It will take a few hours for news of your new subdomain to propagate out to most DNS servers, so take a break and come back later.

DreamHost
Web Admin Pane
Welcome, Will! (Member since February 2006) [Edit Profile] [Log Out]
Home
Billing
Domains
Overview
Manage Domains
Registrations
Reg. Transfer
Remap Sub-Dir
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DNS (Advanced)
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Extra Web Security? (highly recommended)
FastCGI Support? (advanced)
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Both http://www.domain.com/ and http://domain.com/ work.
Add "www." if somebody goes to http://domain.com/
Remove "www." if somebody goes to http://www.domain.com/
Fully host this domain now!
(You can host unlimited more domains, unlimited more sub-domains)

Because *Broadcast Machine* only runs in a very insecure mode, you'll want to partition the video site in a separate subdomain from the rest of your website.

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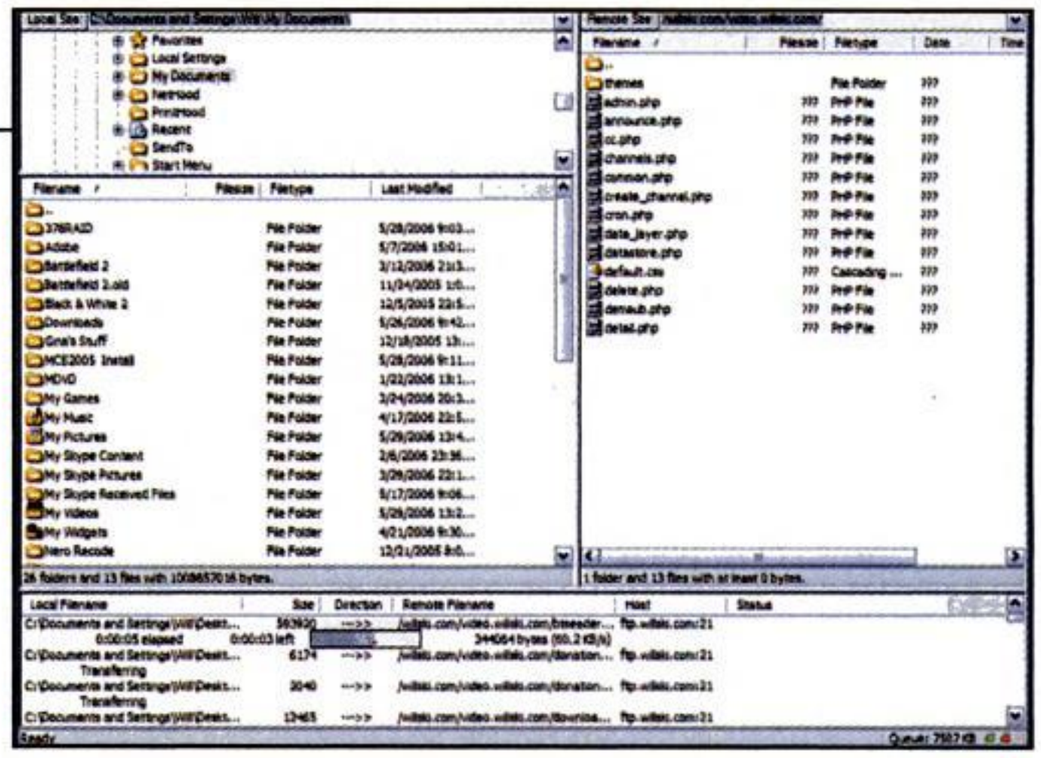
2 Install Broadcast Machine

Installing *Broadcast Machine* is fairly simple: First you should download the latest version of the install file to your local computer from **www.getdemocracy.com/broadcast.** Then unzip the file you downloaded into a folder on your computer, making sure to preserve the folder structure. Then, upload the uncompressed contents of the folder to the directory on your web host where you want to store the program. Our host creates a separate directory for each subdomain we host, so we put ours in /video.willski.com/.

To finish the install, you need to open your website in a browser. (If you can't access your new subdomain, then you need to wait for the DNS update to propagate to your Internet provider's servers. Until then, there's nothing you can really do to hurry the process along.) Once you get to your site, *Broadcast Machine* might prompt you to perform a few tasks to complete the install, but in most cases, you'll just need to create a user account for yourself, and then the install will be complete.

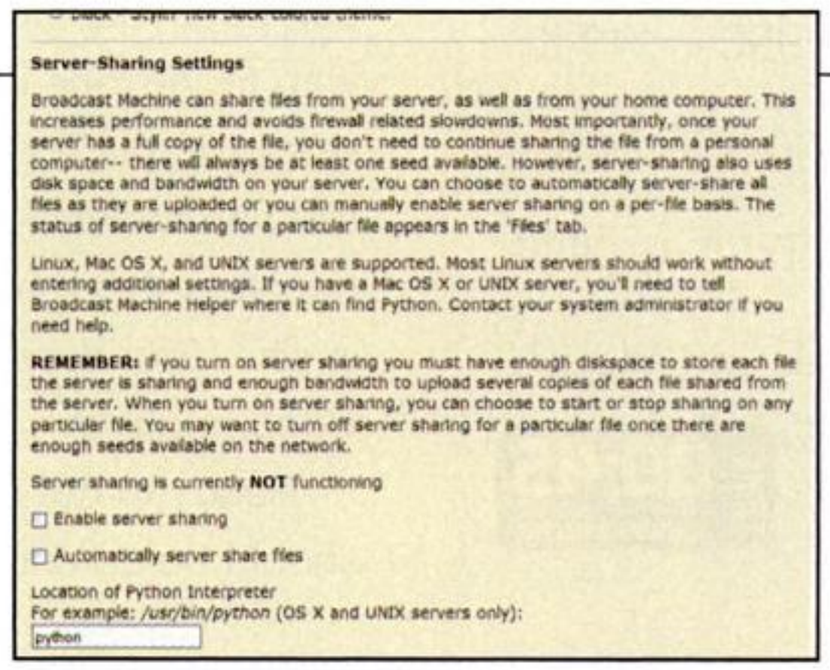


For most users, installing *Broadcast Machine* is as easy as FTPing a directory to your web server.

3 Configure Broadcast Machine

Getting *Broadcast Machine* configured is super simple. Click the Settings tab, and spend a moment reading the page. We highly recommend that you give your site a name and description, enable Direct URLs, and disable server sharing. Server sharing lets your web space also act as a Bittorrent host, which will probably seem like a good idea right up until the time your host sends you a $3,000 bill for your bandwidth overages.

If you expect to see a ton of traffic on your site, you might want to configure *Broadcast Machine* to store its data in a MySQL database. It's not necessary for sites with a few videos and low traffic, so we're going to skip it.

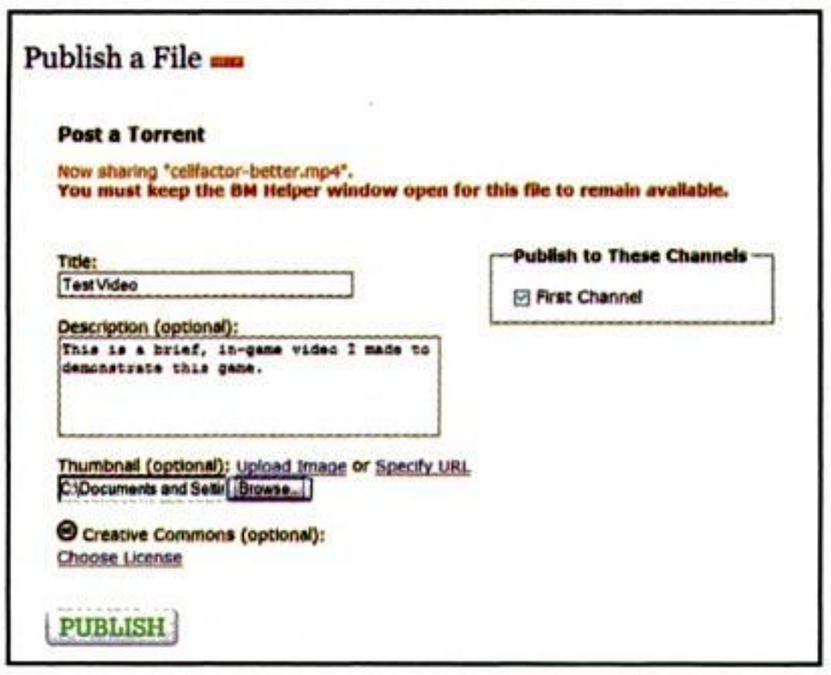

Server-Sharing Settings
Broadcast Machine can share files from your server, as well as from your home computer. This increases performance and avoids firewall related slowdowns. Most importantly, once your server has a full copy of the file, you don't need to continue sharing the file from a personal computer-- there will always be at least one seed available. However, server-sharing also uses disk space and bandwidth on your server. You can choose to automatically server-share all files as they are uploaded or you can manually enable server sharing on a per-file basis. The status of server-sharing for a particular file appears in the 'Files' tab.
Linux, Mac OS X, and UNIX servers are supported. Most Linux servers should work without entering additional settings. If you have a Mac OS X or UNIX server, you'll need to tell Broadcast Machine Helper where it can find Python. Contact your system administrator if you need help.
REMEMBER: if you turn on server sharing you must have enough diskspace to store each file the server is sharing and enough bandwidth to upload several copies of each file shared from the server. When you turn on server sharing, you can choose to start or stop sharing on any particular file. You may want to turn off server sharing for a particular file once there are enough seeds available on the network.
Server sharing is currently NOT functioning
Enable server sharing
Automatically server share files
Location of Python Interpreter
For example: /usr/bin/python (OS X and UNIX servers only):
python

To configure *Broadcast Machine,* all you need to do is browse to the settings tab. Make sure you disable server sharing!

4 Post Your First Video

Now, all that remains is to upload your first file. Click the Publish button on your *Broadcast Machine* site. You should see several options. The first two, "Upload a file directly" and "Link to the file," are great for smaller files that don't need the bandwidth that Bittorrent provides. They're also both fairly self-explanatory.

The third, "Post a torrent," is what you're looking for. Grab your favorite 300MB video file, and click away. As soon as you open the Torrent page, you'll be prompted to install a helper app, which you should install. Once you install the app, close all your open browser windows, then restart your browser, and go back to the Post a Torrent page. Now, the helper app will prompt you for the location of the file you want to post. Once you've selected it, the app will process the file and you can fill in the remainder of the information on the Publish a File page, including the file's name, description, and even a thumbnail image. You should also select a Channel to publish it to. When the helper app is done, press the Publish button, and your file will be available on the web! MPC



Once the helper app has created the torrent file, all you need to do is give the file a name, description, and press Publish!

Getting your video sharing site up is easy and cheap, if you use *Broadcast Machine*.

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Ask the Doctor

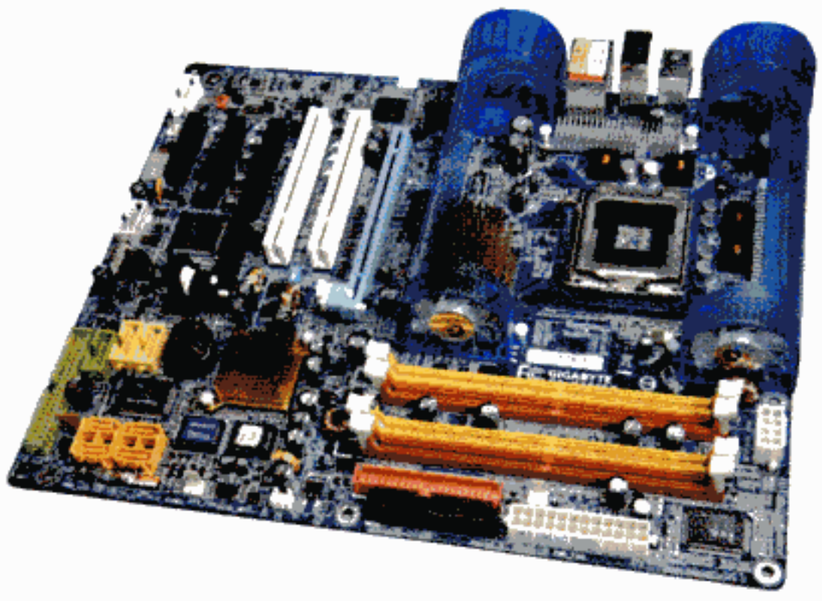
Diagnosing and curing your PC problems

WHO AM I?

I have a problem with the Phoenix BIOS on my Chaintech 9CJS motherboard not staying set. I've used it for almost two years without any problems, but now it resets itself to its default settings after about 50 percent of my reboots. This is a big problem because it doesn't recognize my SATA hard drive, where I've installed Windows XP. I have two IDE hard drives, which are recognized as the primary boot devices by default. Reflashing the BIOS hasn't solved the problem. What could cause a BIOS to do this?

—Larry Sabatino

Your BIOS requires electrical power to retain the contents of its memory; when your PC is shut down, that power comes from a battery on the motherboard. CMOS batteries typically crap out after two to three years (although lithium batteries can last much longer). Refer to your motherboard's user manual for the specific battery, and make sure you don't reverse the polarity when you plug it in.



Always look for the simplest solutions first: If your motherboard's BIOS develops amnesia between startups, you probably need a new backup battery.

HERE TODAY, GONE TOMORROW

I read in the May issue of ***Maximum PC*** *that AMD will move to support DDR2 memory sometime this summer. I'm planning to build a new machine soon, and I want to use an AMD processor. I haven't decided which motherboard to use, but I know it will support SLI. Will any current mobo that supports DDR400 also support DDR2? Or will the motherboard industry introduce a whole new line of AMD- and SLI-compatible parts when the time comes?*

—Ian Currier

Because the Athlon 64's memory controller is located inside the CPU, AMD must fundamentally change the CPU in order to add support for DDR2. AMD is also introducing a new socket design, called AM2 (see our feature about the new socket on page 40); so if you want an AMD CPU and DDR2 memory, you'll have to change both your CPU and your motherboard. These changes won't have any impact on SLI architecture. The Doctor hears from official and unofficial sources, however, that DDR2 will offer only a modest performance boost, if it delivers any at all. If you don't want to wait and don't think you'll ever want to upgrade your CPU, current-generation products deliver excellent performance. But if you're the type of builder who likes to upgrade, you should wait for the new parts, because AMD won't be offering any faster CPUs based on the old architecture. And if you're going to wait, you should also see what Intel's much-hyped Conroe CPU has to offer; it's coming out later this summer, too.

THE SMELL OF BURNING LEATHER

I decided to rebuild an old PC, which has an Intel i865PERL motherboard. I purchased a pair of Corsair's TWINX2048-3200C2 dual-channel memory sticks (one gig each), but the motherboard won't boot with the memory in dual-channel mode (it boots fine in single-channel mode). I successfully ran two of Kingston's 512MB DIMMs in dual-channel mode, but I want more than 1GB of memory. Is there some BIOS setting I can tweak to get the Corsair memory to function?

I also have another problem. I used the Kingston memory to get the machine going, but I noticed that my AGP videocard wasn't properly seated. When I reseated the card, it made a funky noise and produced an awful smell. I know the videocard still works, because I tested it in another PC, but the first PC no longer boots, and it doesn't have onboard video. Any suggestions?

—Jeff Hurt

The Doc knows first-hand that 1GB modules work on the D865PERL, because he's used such a configuration before. The problem isn't the capacity; rather, it's likely related to the particular RAM you're using. Corsair's SPDs can be too aggressive, leading to boot issues on some motherboards. (An SPD, or Serial Presence Detect, is an EEPROM on the memory module containing information about the memory, including its size and speed. The motherboard's BIOS uses this data to establish default timing values, among other things.)

First, install the Corsair memory, boot into the BIOS, and set higher latencies. If that doesn't work, or if the machine won't POST, install the Kingston RAM and update the BIOS. If it still doesn't work, contact Corsair for advice: The company has very good support and may exchange your modules.

Your videocard problem, on the other hand, is much more serious. You should never reseat or monkey with any components in your PC while it's in "hot" mode. Always, always unplug the power supply and wait 10 or 20 seconds for the capacitors to discharge before working on it. If your AGP card is still functional, a bad smell and sizzle sound usually means you shorted something in the slot. If your AGP slot is toast, you *could* install a PCI videocard, but your system performance will suffer for it.

REFRESHER COURSE

I know that when using a CRT it's a good idea to increase the videocard's refresh rate above 60Hz in order to reduce flicker. Is that also the case with an LCD?

—John Meyer

You should always set your videocard's refresh rate to the highest setting your monitor supports, but the reason for doing so with a CRT monitor is very different from the one for an LCD. A CRT displays an image by using an electron gun to fire a beam of electrons at phosphors painted on the inside of a vacuum tube, which glow in response. In the progressive-scan world in which computers operate, the beam moves horizontally from left to right, drops down one line, and draws another line. Refresh rate measures how many times per second the gun, controlled by the videocard, is able to scan the entire CRT and return to the first top line. The brightness of the phosphors begins to decay as soon as the beam moves on, but your eyes won't notice it unless the refresh rate is below 72Hz for a smaller monitor, or below 85Hz for a larger display.

LCDs operate on a completely different principle: With this technology, a cell opens to allow a continuous stream of light to pass

SECOND OPINION

I can empathize with David Ratliff III, who described his problems with *SpyFalcon* in your June 2006 column. I've had to deal with its first cousin, *SpyAxe*. As a PC technician, I've tried virtually every fix available for this crud, and I've concluded that the absolute easiest, quickest, has-not-failed-me-yet solution is—drum roll, please—Windows XP's System Restore. You can spend hours digging through the fog published on anti-spyware sites, or you can spend just a few minutes with System Restore.

—Bill Boothman

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Ask the Doctor

through. Since the image doesn't decay over time, there is no flicker. But because the refresh rate limits the number of images the LCD can display each second, you should still set your videocard to the maximum refresh rate the monitor supports.

SHORT QUESTION; LONG ANSWER

My new Raptor has a jumper that, by default, disables a feature called spread-spectrum clocking (SSC). What will happen if I remove the jumper to enable SSC? What kinds of symptoms might I observe that would tell me it's a bad idea?

—Luke Marston

You've stumped the Doctor, Luke. But you also piqued my curiosity, so I asked one of Western Digital's engineers to enlighten me. Here's what I learned: spread-spectrum clocking (SSC) is a frequency-modulation technique used in the design of synchronous digital systems, such as hard drives, to reduce the spectral density of the electromagnetic interference (EMI) that these systems generate. Because of its precise periodic nature, the system emits spectral energy that's concentrated in a very narrow frequency band. In fact, a perfect clock signal would have all its spectral energy concentrated in a single frequency and its harmonics. But this creates emission-energy peaks that can interfere with the operation of the neighboring electronics.

SSC lowers peak spectral energy—and thus, EMI—by modulating the frequency of the clock signal by a small amount, usually 0.1 percent to 0.5 percent. There are established standards that define specifications and measurement procedures for characterizing EMI emissions, and there are special EMI labs equipped for this kind of testing.

Western Digital tells us it has had its drives tested in third-party EMI labs, and the drives' EMI emissions didn't really vary with SSC enabled or disabled. Lab tests did reveal, however, that SSC hurts a drive's performance because the intentional modulation of the clock frequency—however minor—eats away at the drive's valuable jitter-tolerance margin. The SATA spec dictates that a SATA drive must be capable of receiving a signal with SSC; i.e., if the host is modulating its clock at the transceiver, the drive must be capable of locking on and tracking it. On the other hand, the spec states that actually transmitting with SSC is optional. According to Western Digital, most of its SATA drives support SSC but are routinely shipped with SSC turned off. As for indicators that enabling SSC is a bad idea, Western Digital says there are probably no readily observable symptoms.

Most of Western Digital's SATA hard drives support a high-falutin' feature known as Spread Spectrum Clocking, but it's typically disabled when the drive's are shipped.

SPLIT PERSONALITY

I decided to establish a dual-boot system using Windows 98SE and Windows XP Pro in order to solve some vexing compatibility issues with legacy software. That's when I learned the ugly truth: Windows 98SE does not support SATA drives.

I encountered this while installing 98SE; specifically, at the phase where it should boot to the desktop "for the very first time." It was more like "not a chance, Slick."

Is there any way I can get Windows 98SE to run from a SATA drive?

—Ernest Smith

The Doctor has never tried this specific setup (we exiled Windows 98SE from Lab paradise many years ago, and have since experienced neither the need nor the desire to invite it back), but your problem isn't really a SATA issue; rather, it's an OS conflict.

When you install Windows 98 on a system that already has a Windows XP installation, Win98 detects the XP boot loader and overwrites it in favor of its own. This, of course, makes it impossible to boot into XP. The trick is to install Win98 first, and then install XP. XP's boot loader will recognize the other OS's presence and give you the option of booting from either.

Don't forget that you need a compatible host controller—either on the motherboard or in the form of an add-in card—in order to run a SATA hard drive. You should have no problem finding Windows 98 drivers for popular add-in SATA controllers. You'll also find tutorials for installing SATA drives with Windows 98 on Seagate's and Microsoft's respective websites.

WINK-WINK

*I'm running Windows XP with two Western Digital Raptors in Raid 0 and an nForce4 motherboard, with the latest chipset drivers. I've noticed that my hard drive access light keeps blinking even when I'm not doing anything on my computer; the hard drive power-down option isn't working, either. I've run four anti-spyware and -virus programs, which haven't turned up anything. There's nothing much in my task-bar: icons for my Logitech keyboard and mouse icons, plus two **Yahoo Widgets.***

*I installed **FileMon** next, and noticed that **Notmad Explorer** (third-party software for Creative's Zen MP3 player) and **ZoneAlarm** were almost constantly accessing my drive. **Zone Alarm** was writing a ton of log files. I uninstalled **Notmad** and turned off **ZoneAlarm's** log files, which helped, but Windows still accesses a lot of files. Turning off Windows' index service didn't make much of a difference, either.*

Is all this normal? How do the hard drives power down if they're always in use?

—Sean Kerzo

There's no reason to worry about your hard drive being frequently accessed: It's not bad for the drive and is, in fact, pretty normal. Because you're running one large volume with Windows installed on it, Windows will always be accessing the drive to save to or read from the page file, to auto-save something, to cache a web page, and so on. Besides, the process of spinning everything down to shut off the drive, and then spinning it all back up again, puts more stress on the drive than just having it spin constantly. The bottom line: Don't sweat it. MPC

So, a priest, a lawyer, and a doctor walk into a computer store…. Submit your most vexing computer problems—and your best doctor jokes—to doctor@maximumpc.com.

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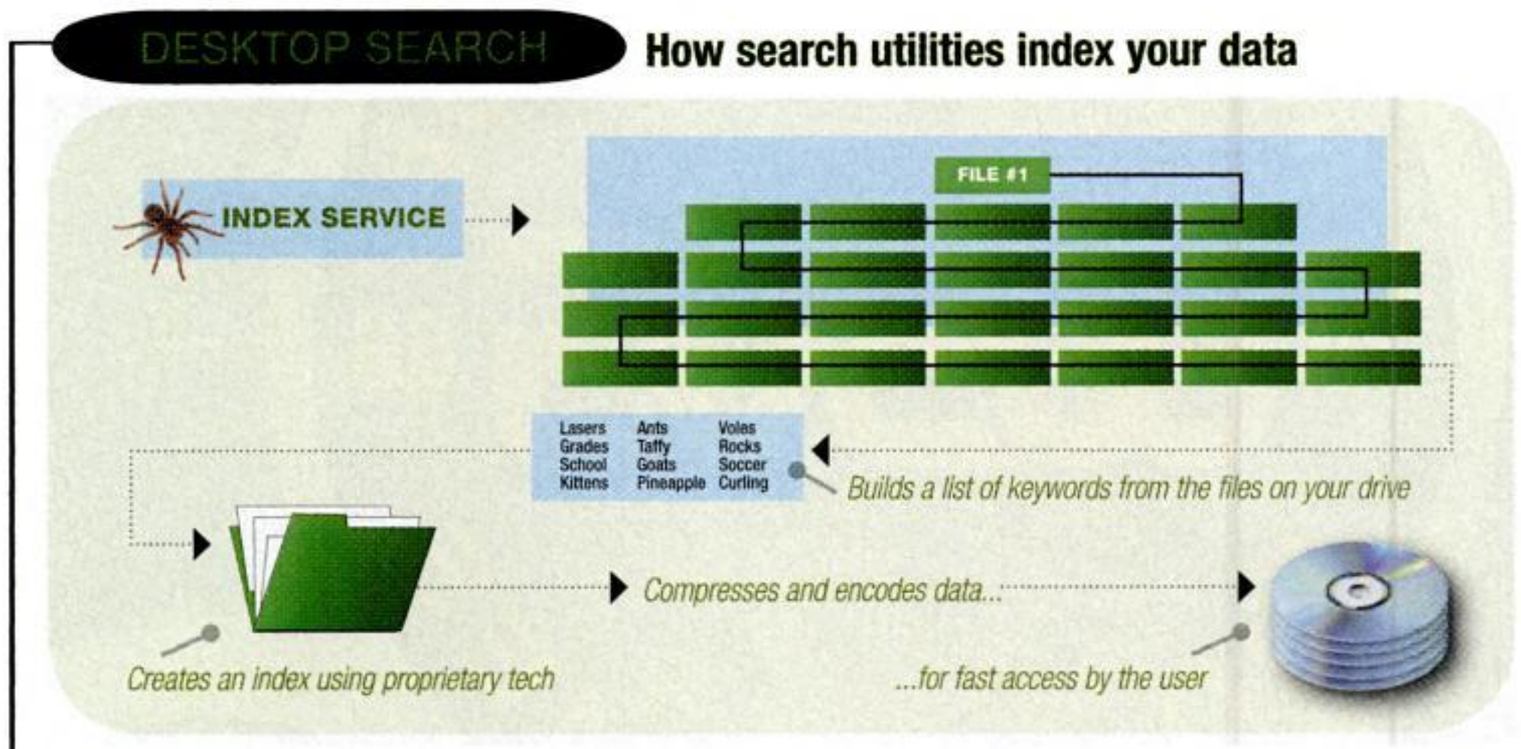
White Paper: Desktop Search Engines

Seek and ye shall find? With third-party desktop-search utilities, your chances are better. We investigate what makes these utilities unique from each other and from their Internet-based counterparts.

BY GORD **GOBLE**


DESKTOP SEARCH
How search utilities index your data
INDEX SERVICE
FILE #1
Lasers Ants Voles
Grades Taffy Rocks
School Goats Soccer
Kittens Pineapple Curling
Builds a list of keywords from the files on your drive
Compresses and encodes data...
Creates an index using proprietary tech
...for fast access by the user

Desktop search engines function in much the same manner as web search engines. First, they scan the contents of you hard drive to build an index. Then, when you run a search with the desktop-search client, the app scans the index, before it can return the relevant results to you.

The war—and make no mistake, it is a war—for search-engine supremacy may have begun on the Internet, but it's quickly migrated to the far more personal confines of your own computer. It's a battle that will only grow in ferocity as we continue to buy bigger hard drives and fill them with increasingly diverse material. Windows' sluggishly mediocre search dog may have been OK when we cruised comparatively tiny 20GB hard drives for *Word* documents and spread sheets, but it just won't cut the mustard when faced with 300GB monsters stuffed with photos, videos, songs, correspondence, homemade Christmas cards, and just about anything imaginable in most every file format possible.

It's no coincidence that many of the biggest names in the Internet search business—Google, Yahoo, Microsoft, et al—are also dominant in the world of desktop searching. The fact is that the two technologies share many of the same concepts and inner workings (and secrets too).

Let's first look at the Internet variety. When you initiate a search via Google or Yahoo, or any of today's popular engines, you aren't actually searching the Internet. You are, in fact, exploring a database of information that your chosen search engine has already culled from across the web. Indeed, Internet search engines never stop gathering data from the vast recesses of Internet space. It's a continual, nonstop process known as "indexing."

WEBS, SPIDERS, AND CREEPY CRAWLERS

At the heart of the indexing process are automated software programs known as "spiders." Spiders typically begin their perpetual journeys at established, heavily visited sites and servers, scanning and recording oft-used words, keywords, and important links. Then they visit all of the links they discover, continuing to record even more words and visiting even more links. By the time you punch in a search string, the spiders have built an index of tremendous proportions. If indexing wasn't part of the equation and you were forced to truly search millions or billions of the web's pages rather than a preconstructed index of same, your search could take hours, days, or weeks rather than seconds. And even then it wouldn't be nearly as conclusive.

Each search engine utilizes its own unique set of parameters, which are tightly guarded trade secrets. Most will omit insignificant words such as "the" and "and." Some revisit sites more often than others, thereby more efficiently unearthing and omitting dead links and outmoded pages and adding new ones. Some are better than others at handling meta tags (hidden website keywords and information created by that website's author—sometimes used unscrupulously to attract more attention to that site). Some will put more emphasis on titles, subheads, and links than others do, and words that appear several times within a site or are placed in more prominent positions are assigned more value than words that appear only once. Google is currently the most popular Internet search engine because it is perceived to expediently deliver the most relevant results by factoring in all the information above.

INDEX THIS

In a general sense, desktop search utilities operate similarly to Internet search engines. Like their Internet brethren, the key to their success is in the building of indexes. However, unlike their Internet equivalents, they don't build indexes nonstop. Why? Because their hunt for information puts a serious strain on your system resources *and* your hardware. If these desktop utilities went at it continuously, they'd cripple your computing efficiency and quite likely prematurely burn out your hard drive. And, when you think about it, they don't really need to go at it continuously because your own personal computer's hard drive doesn't experience change nearly as often as the Internet.

When you first install a desktop search engine, it will begin the indexing process the next time your machine is idle. It scans the information on your PC, converts key data to a format it understands, and inserts that information into its database. Then, whenever you type a query, it searches that database for your info. It collects information not just from file and directory names, but also from metadata (like ID3 tags on music files or the EXIF data your

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camera writes to photos), and the content of documents. It analyzes information to pick out patterns and relative and statistical information. And, one day in the not so distant future, it will also search the content of images, audio files, and video files by context.

On a typical home PC, initial indexing may take several minutes or a few hours, depending on the amount and complexity of material therein and the search engine you're using. After the initial index is complete, most desktop search apps only scan new and changed files when your machine is idle.

SEARCHING AIN'T WHAT IT USED TO BE

The strongest engines, such as Copernic Technologies' *Copernic Desktop Search,* offer real-time indexing. With real-time indexing, the engine's database will update instantly whenever you add or modify the contents of your hard drive, thus ensuring a live result every time you search. Of course, if you'd rather delay indexing until you're not at the computer and thereby reserve all your system resources for your immediate use, you can do that too. In that case, most desktop search utilities will monitor CPU activity and mouse movements and execute indexing only during idle or slow periods.

The freely available desktop search engines from Google and Microsoft offer other advantages too. Some, for example, will know immediately when you've deleted a file that's already been indexed, and then automatically delete the corresponding index reference too. Some programs recognize and support significantly more file formats than others—again, *Copernic* currently leads the way—and some offer Boolean search parameters (terms joined with conjunctions such as "and," and "or."). Some sport faster algorithms, and some are less resource hungry. Most offer extensibility, so software vendors can make their proprietary formats searchable.

Interfaces and options also vary wildly from one program to another. In its first foray into desktop searching, Google, for example, merely added a desktop tab to its existing Internet search interface. Microsoft opted for a full, helpful interface for *Windows Desktop Search,* which also replaces the useless search dog interface that shipped with Windows XP. *Copernic's* interface is generally regarded as one of the best in the desktop search industry, but it can be intimidating for neophytes.

Ultimately, the distinctions between desktop search engines is substantially more pronounced than that of Internet search engines, so you should test several of these mostly no-charge utilities before making your final decision. Even then, trying a new version is as easy as installing an app. MPC

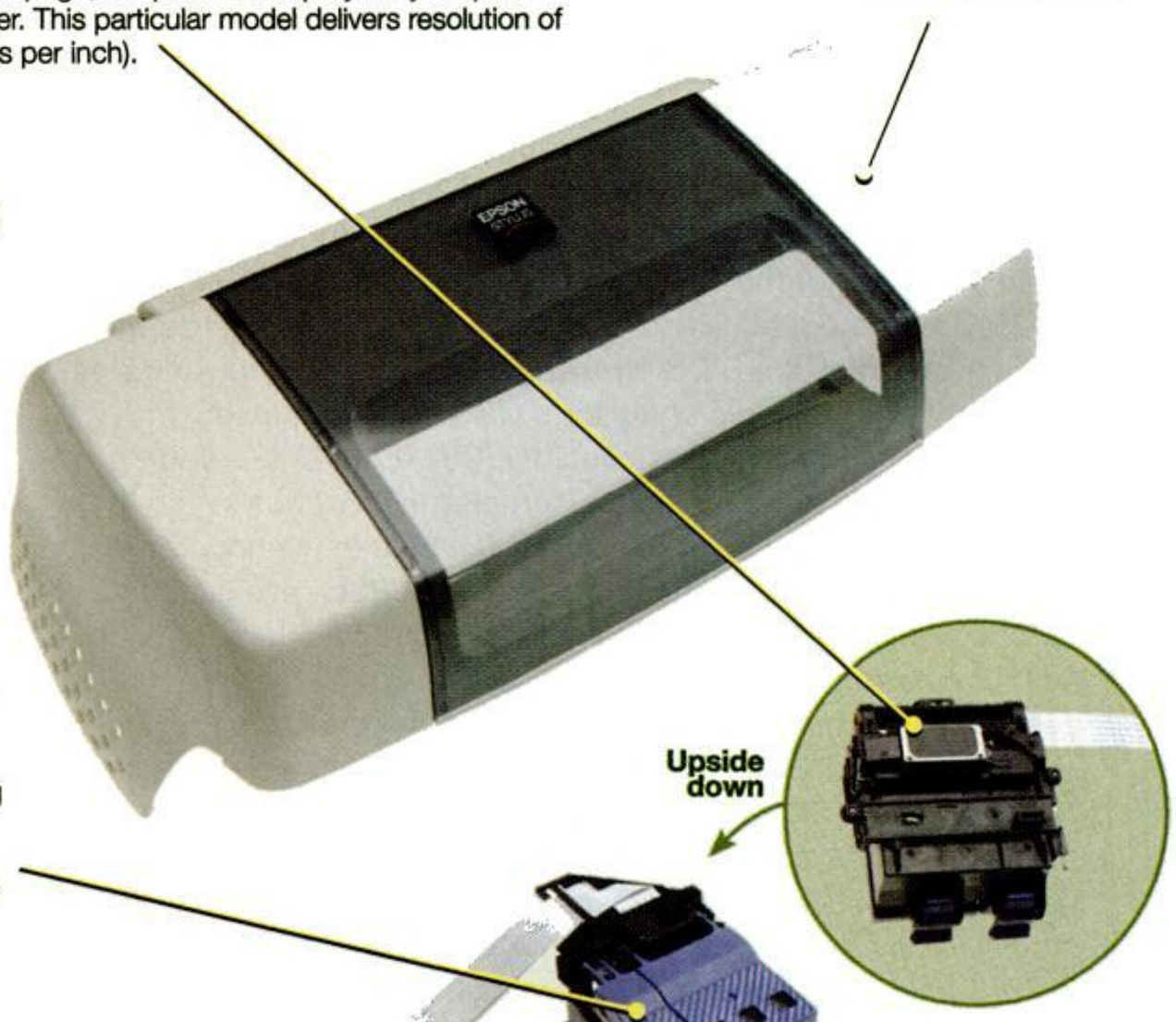
Inkjet Printer

Inkjet has become the go-to technology for today's printer manufacturers, especially when it comes to color. We opened up this inkjet and discovered some deceptively simple machinery.

PRINT HEAD The actual print head is on the bottom of the print-head assembly. As the stepper motor moves the print-head assembly across the page, the print head sprays tiny droplets of ink onto the paper. This particular model delivers resolution of 1,440x720 dpi (dots per inch).

COVER The cover prevents dust and other foreign objects from falling into the printer and gumming up the moving parts.

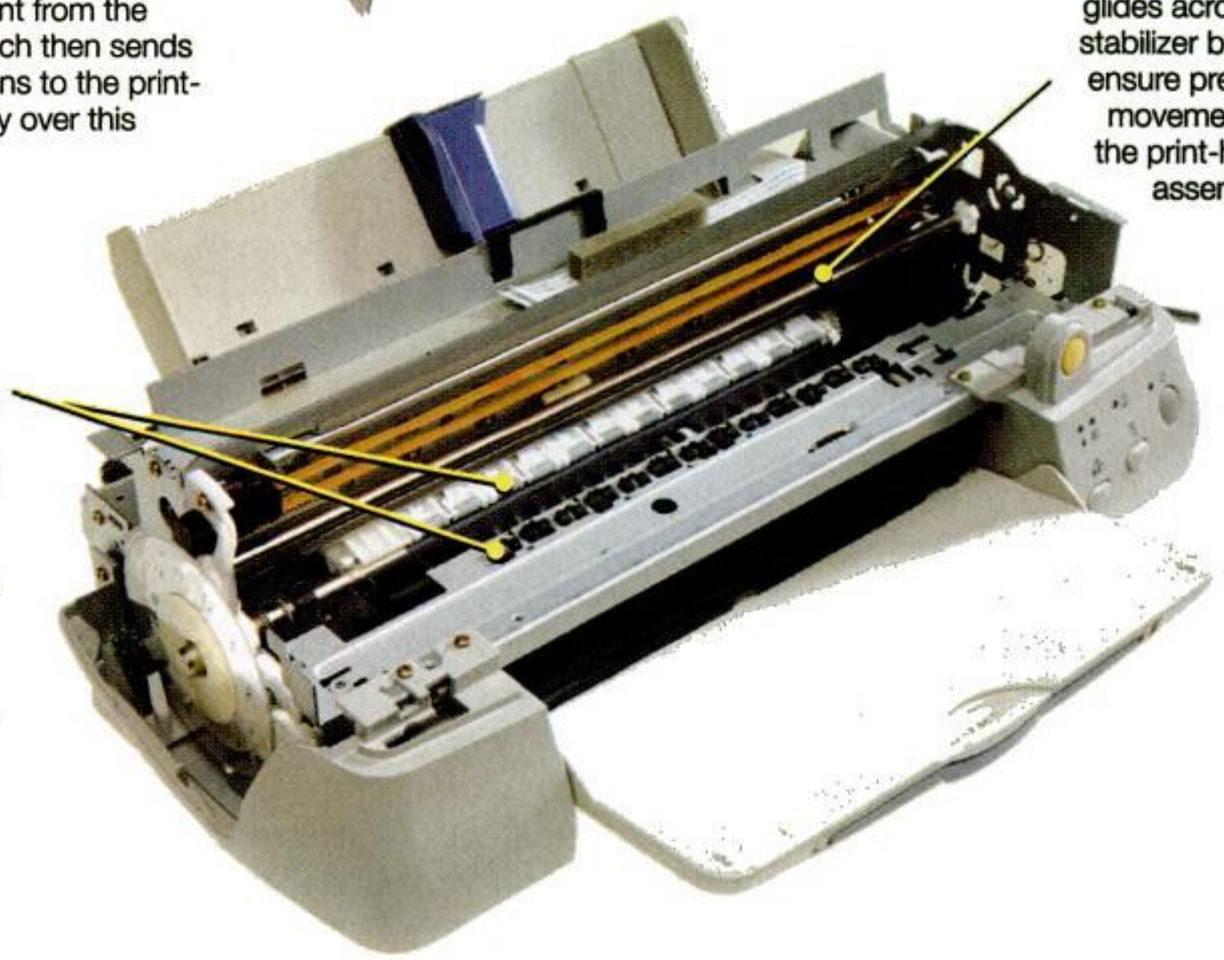
INK CARTRIDGES This printer uses two ink cartridges. The one on the left contains black ink, which is often consumed more rapidly than color because it alone is used to print text. The cartridge on the right contains five inks—cyan, magenta, yellow, light cyan, and light magenta—which are mixed with black during printing to create all the other colors. Some printers use three or more separate cartridges for color.



RIBBON CABLE The printer's control circuitry (not shown) receives and decodes information sent from the computer, which then sends print instructions to the print-head assembly over this ribbon cable.

STABILIZER BAR Because the belt is flexible, the print glides across a stabilizer bar to ensure precise movement of the print-head assembly.

ROLLERS These rubber rollers pull the paper in from the dispenser, advance it a fraction of an inch when the print-head assembly is ready to make another pass, and then deposit the page in the output tray when it's finished.



GORDON **MAH UNG**

Takes nForce 590 SLI for a Ride

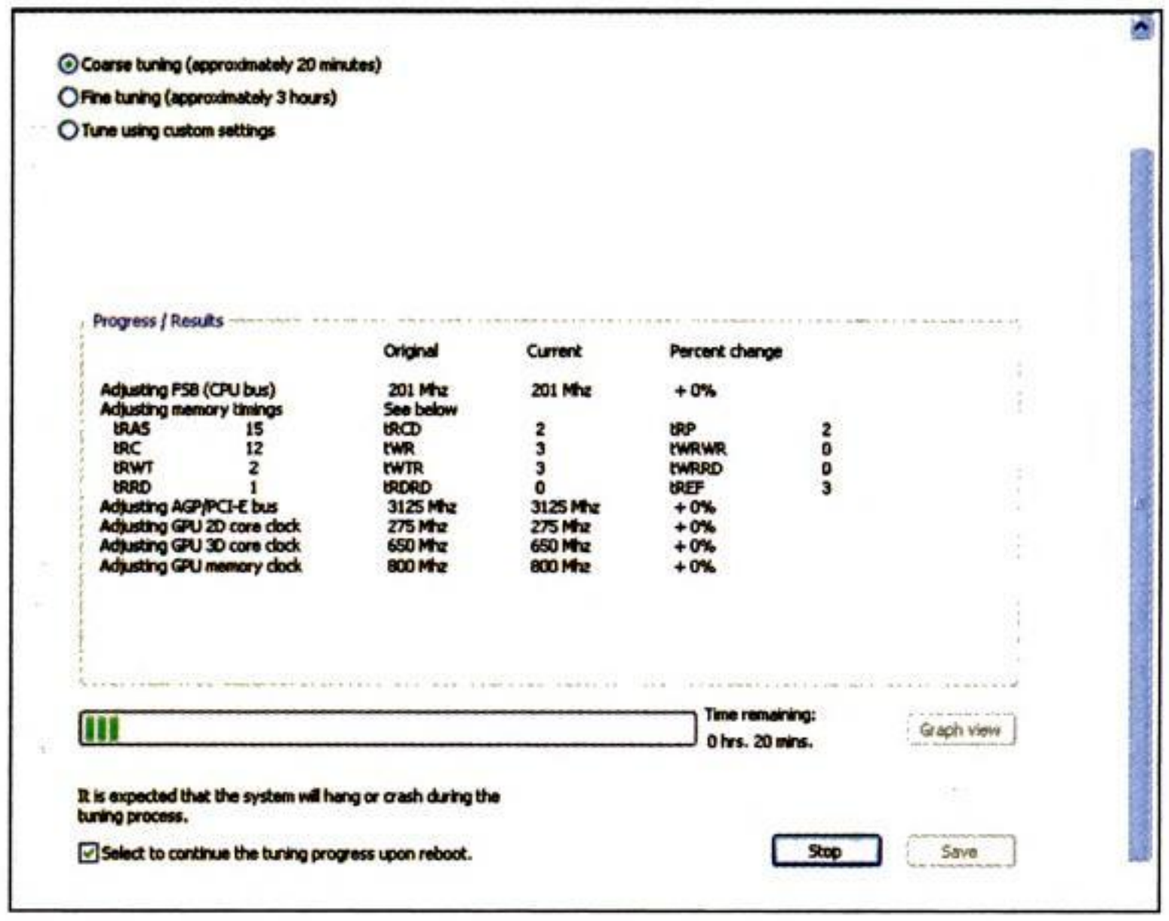
nVidia's new chipset ships with a wealth of enthusiast features

In the silicon pecking order, core-logic chipsets rate pretty low in perceived sexiness. The new nForce 590 SLI, however, is a chipset worth getting excited about—at least for enthusiasts.

To get a feel for the 590, I fired up Foxconn's C51XEM2AA 590 SLI AM2 motherboard, which follows the nVidia reference design. nVidia even writes the BIOS for the board, so it's probably the closest thing you'll get to the company's vision for the chipset.

With the nVidia drivers installed, the C51XEM2AA lets you change most of your BIOS settings from within Windows; you can tweak the boot order or switch on the built-in memory tester. OS hooks to the BIOS aren't new—notebook PCs have had that for many years—but it's good to see advanced functionality on a desktop board for enthusiasts.

More exciting is the support for "SLI-Ready RAM" and Enhanced Performance Profiles (EPP). The Foxconn board was able to pull information from a set of EPP-enabled Corsair memory modules to clock the RAM to its highest setting, without any manual adjustment of timings and the like (which other motherboards and chipsets require). After a reboot, our DDR2 800MHz RAM was running at 981MHz with the processor at its stock 2.8GHz. It'll be interesting to see if JEDEC, the organization that sanctions changes to RAM, approves nVidia's and Corsair's custom venture.


Coarse tuning (approximately 20 minutes)
Fine tuning (approximately 3 hours)
Tune using custom settings
Progress / Results
Original
Current
Percent change
Adjusting FSB (CPU bus) 201 Mhz 201 Mhz + 0%
Adjusting memory timings See below
tRAS 15 tRCD 2 tRP 2
tRC 12 tWR 3 tWRWR 0
tRWT 2 tWTR 3 tWRRD 0
tRRD 1 tRDRD 0 tREF 3
Adjusting AGP/PCI-E bus 3125 Mhz 3125 Mhz + 0%
Adjusting GPU 2D core clock 275 Mhz 275 Mhz + 0%
Adjusting GPU 3D core clock 650 Mhz 650 Mhz + 0%
Adjusting GPU memory clock 800 Mhz 800 Mhz + 0%
Time remaining:
0 hrs. 20 mins.
Graph view
It is expected that the system will hang or crash during the tuning process.
Select to continue the tuning progress upon reboot.
Stop
Save

The nForce 590 SLI chipset lets you wring the most from your RAM without having to know the esoteric meaning of a tRP or tRCD.

The nForce 590 also includes network teaming, which lets you combine the bandwidth from both integrated Gigabit Ethernet ports into a 2GB port. Also on the network beat is FirstPacket, which adds network prioritization tuned for gaming to the chipset's integrated Ethernet. FirstPacket seemed to have no effect on our corporate LAN, so I contacted nVidia. Its response? FirstPacket is designed for more-limited bandwidth situations than you get in an office scenario, such as a home broadband connection. We'll do more testing and report back to you soon.

FirstPacket aside, I'm pretty impressed with the new nForce 590 SLI. The folks at nVidia seem to be taking the pulse of enthusiasts and it shows.

Josh Norem

Tests Water-Cooling Fan Placement

Which is better, sucking or blowing?

Installing a DIY water-cooling kit raises several questions: Aside from figuring out pump placement and the configuration of your water circuit, there's also the vexing problem of your fan and radiator configuration. Do you want to install the fan so that it pushes or pulls air through the radiator? Does it even matter? Because most water-cooling aficionados care primarily about performance, I set up some simple tests to figure out the answer.

For my test, I grabbed the Danger Den AMD kit (reviewed on page 72), which includes an internal 12cm fan that can be mounted in either orientation. I installed the kit in a Kingwin SK-523BKW ATX mid-tower and let it run for a few hours to push all the air out of the water lines. I then ran it with the fan pulling air through the radiator and out of the case, and took measurements. My second run reversed the airflow, so the fan pushed air through the radiator. Naturally, I conducted the test with the door closed, to simulate a real-world, water-cooling environment in a compact case. I used the motherboard's onboard sensors to determine the internal case temperatures.

The winner? Pushing air through the radiator won, but not by a huge margin—just 3 C. The results were somewhat specific to the kit, however, as the Danger Den configuration blows hot air into the case, which is far from ideal. Other kits allow you to mount the radiator at the front of the case, where you can push cool air through the radiator, and then rely on some large, slow fans near the CPU to exhaust the hot air.

BENCHMARKS

	SUCKING	BLOWING
IDLE (C)	38	**37**
100% LOAD (C)	45	**42**

Best scores are bolded. All temperatures were measured via the onboard sensors, using the utility provided by the motherboard manufacturer. Idle temperatures were measured after 30 minutes of inactivity and full-load temps were achieved running CPU Burn-in for one hour.

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How We Test

Real-world benchmarks. Real-world results

Computer performance used to be measured with synthetic tests that had little or no bearing on real-world performance. Even worse, when hardware vendors started tailoring their drivers for these synthetic tests, the performance in actual games and applications sometimes dropped.

At *Maximum PC,* our mantra for testing has always been "real world." We use tests that reflect tasks power users perform every single day. With that in mind, here are the six benchmarks we use to test every system we review.

SYSmark2004 SE: This is an update of the *SYSmark2004* benchmark, which uses a suite of such common applications as Microsoft *Word, Excel, PowerPoint*, Macromedia *Dreamweaver*, *Flash,* and *Winzip* to test general performance. It isn't heavy in multithreading, but it does feature multitasking tests.

Adobe Premiere Pro 2.0: We finally ditched our old standard-def *Premiere* test for one that uses high-def source material. The test is multithreaded, uses the GPU for transitions, and is brutal. It takes about an hour on our zero-point to render a short two minute, 46 second benchmark movie in the program.

Adobe Photoshop CS2: We start with a RAW photo shot with a Canon EOS 20D, and apply a crapload of filters and other tasks from *CS2* to see just how fast a rig can chew through the workload. Because we use every filter we can, the test is more fair and balanced than the usual cherry picking of *Photoshop* tests.

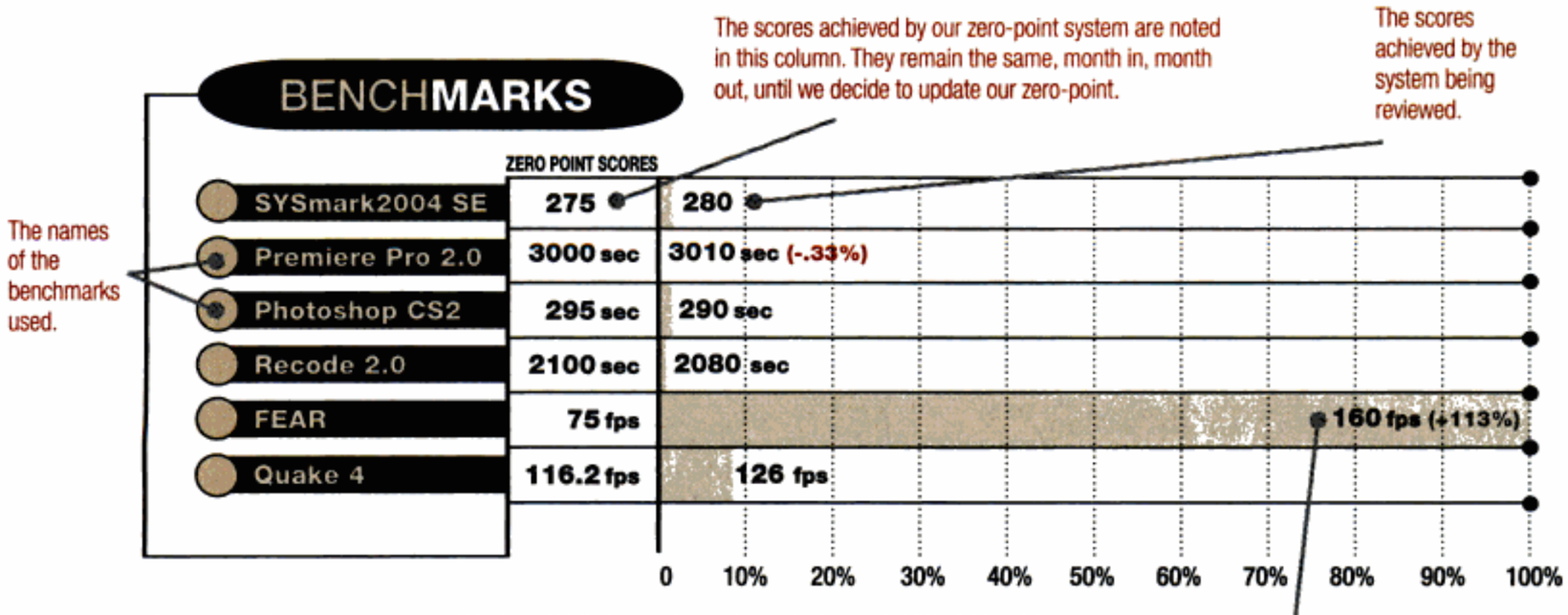
Ahead Nero Recode 2.0: *Nero Recode 2.0* is one of the fastest video-transcoding utilities. We copy unencrypted VOB files to the hard drive, then convert the movie to the Sony PSP's MPEG-4-based format. The program is heavily multithreaded, and shows marked performance increases on dual-core machines.

Quake 4: Based on the *Doom 3* engine, *Quake 4* is a popular OpenGL game. We run our test at 1600x1200 with 4x antialiasing and 4x anisotropic filtering. Generally, more robust OpenGL drivers yield better performance. We use a custom timedemo recorded using the 1.2 patch, which supports Hyper-Threading and dual-core processors.

FEAR: Monolith's *FEAR* is a cutting-edge DirectX game that pushes graphics hardware and systems to the limit. We run *FEAR* at 1600x1200 with soft shadows, physics, and audio acceleration enabled, and using the 1.03 patch.

How to Read Our Benchmark Chart

Maximum PC's test beds double as zero-point systems, against which all review systems are compared. Here's how to read our benchmark chart.



Our current desktop test bed is a Windows XP SP2 machine, using a dual-core 2.6GHz Athlon 64 FX-60, 2GB of Corsair DDR400 RAM on an Asus A8N32-SLI motherboard, two GeForce 7900 GTX videocards in SLI mode, a Western Digital 4000KD hard drive, a Sound Blaster X-Fi soundcard, and a PC Power and Cooling Turbo Cool 850 PSU.

Every month we remind readers of our key zero-point components.

BEST OF THE BEST

Our monthly category-by-category list of our favorite products. New products are in red.

High-end videocard, dual-card config
XFX GeForce 7900 GTX (model PV-T71F-YDD9)

High-end videocard, single-card config
eVGA e-GeForce 7950 GX2
Even single-slot PCI-E motherboards can run SLI now thanks to the GX2

Midrange videocard:
Sapphire Radeon X1900GT

Soundcard:
Creative Labs X-Fi Xtreme Music

Hard drive:
Seagate Barracuda 750GB 7200.10
Do we need to say anything more than 750GB? It's also really fast!

External backup drive:
Western Digital Dual-Option Media Center 320GB

Portable USB drive:
Seagate Portable External Hard Drive 100GB

DVD burner:
Plextor PX-716A

Widescreen LCD monitor:
Dell 2405FPW

Desktop LCD monitor:
NEC 90GX2

Socket AM2 Athlon 64 mobo:
We don't have a Socket AM2 recommendation yet, but you shouldn't spend money on Socket 939 at this late date

Socket 775 Core 2 Duo mobo:
We don't have a recommendation yet, but you shouldn't buy an Intel mobo without Core2Duo compatibility

Portable MP3 player:
Apple iPod

5.1 speakers:
M-Audio Studiophile LX4 5.1 (LX4 2.1 with 5.1 Expander System)

2.1 speakers:
M-Audio Studiophile LX4 2.1

Mid-tower case:
ThermalTake Armor Jr.
Less expensive than our previous pick, and it doesn't use an inverted motherboard tray design

Full-tower case:
Silverstone TJ07

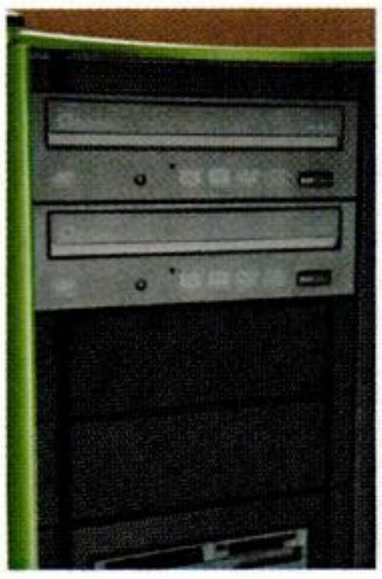
Games we are playing: Half Life: Episode 1, Tomb Raider: Legend, Tom Clancy's Ghost Recon: Advanced Warfighter, SiN, Battlefield 2

Monarch Computer Systems Nemesis 2

This green machine won't like it if you make it angry

Monarch's new Nemesis 2 is so green, we had to resist the urge to shout: "Hulk smash!" when we first set up the machine. But is the Nemesis 2 really like the brutishly powerful gamma-ray hero, or a silly wannabe like the Green Arrow?

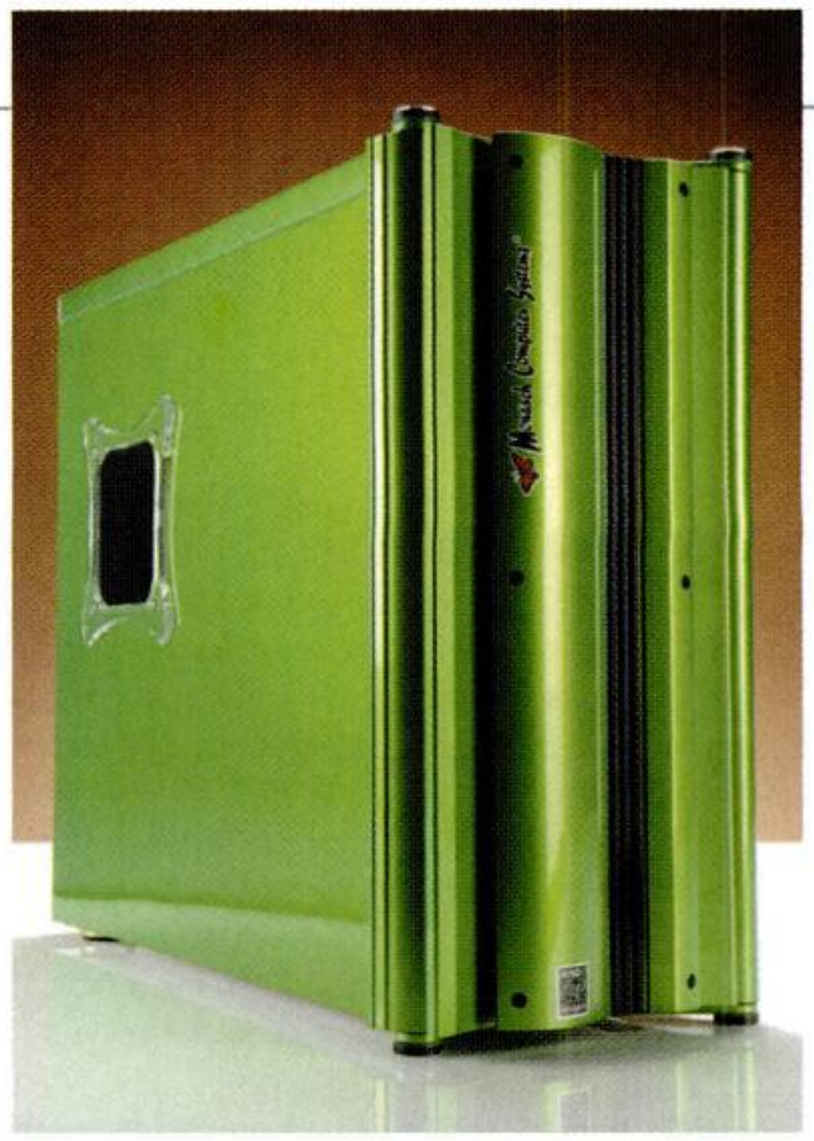
Looking at the hardware build, you'd certainly think brute. After all, the Nemesis 2 sports fresh-off-the-assembly-line parts, including AMD's new performance king, the Athlon 64 FX-62 in an Asus M2N32-SLI Deluxe motherboard, along with 2GB of Corsair DDR2/800 RAM. Riding shotgun in the x16 PCI-E slots are two GeForce 7900 GTX cards with 512MB frame buffers.



Monarch packs two 18x Plextor DVD burners into the Nemesis 2.

These are no plain 7900 GTX cards, either (if you can call a 7900 GTX plain). Monarch said it teamed with eVGA to offer "über overclocked" cards. How overclocked is über? Stock 7900 GTX cards feature a core clocked at 650MHz and RAM at 800MHz —Monarch's eVGA cards clock in at 702MHz and 880MHz, respectively. It's a pretty good boost, but a tad shy of the fastest 7900 GTX in this month's videocard roundup (see page 24). Still, it's nearing the ragged edge of the GTX's air-cooling envelope. (In fact, the first prototype cards we received with the Nemesis 2 were unstable and couldn't make it through two passes of *FEAR*, or even start *Quake IV.* Monarch said the problem lay with the two preproduction cards it submitted with the system (a decision based on time constraints. The company supplied another pair of cards that did function as advertised. Just to make sure, we ran *3DMark06* at 1600x1200 resolution for two days, and the cards did not crash.)

For optical chores, Monarch taps Plextor for two of its 18x DVD burners. Never heard of 18x media? That's because there isn't any. The Plexy will burn 16x media at 18x speeds if your media can handle the speed. Our complaint? Both drives are slaved to a single PATA port (nVidia dropped support for the second PATA port in its 500 series.) With both drives sharing the same connection, you take a performance hit when both burners are running simultaneously. Monarch isn't the only vendor to commit the faux pas; quite a few machines we've reviewed recently have made the same blooper with dual drives.



nVidia's sexy new nForce 590 SLI chipset powers the Nemesis 2.

In the hard drive department, the Nemesis 2 delivers an admirable balance of speed and space. A pair of 10,000rpm 150GB WD Raptors pull main OS duties, while two honking-huge Seagate 750GB Barracuda drives round out the storage story. A small complaint, however: The two Barracudas are in a RAID 0 array, like the Raptors. We'd just as soon give up the speed of the RAID 0 Barracudas for the safety of an unstriped JBOD config, or even a mirrored RAID 1 config. Now all we need is an easy way to backup 1.5TB of data....

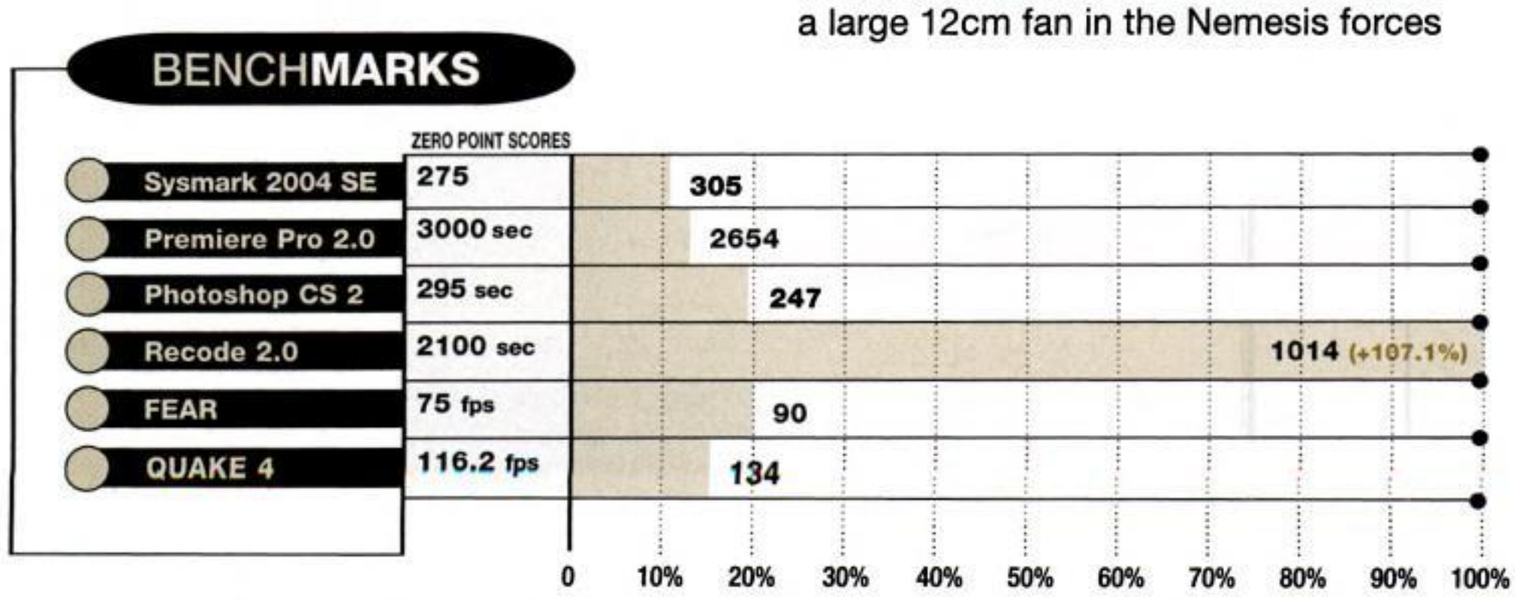
The Nemesis 2 manages this storage extravaganza with the dual-RAID capabilities of the new nVidia nForce 590 SLI chipset, which supports RAID on all six SATA ports. The 590 also sports port teaming and the ability to prioritize packets from designated apps, so you can technically play a game and download torrents without hurting your ping.

Monarch must have been wary of overheating drives and videocards, because a large 12cm fan in the Nemesis forces

UNDER THE HOOD

BRAINS	
CPU	AMD Athlon 64 FX-62 (2.8GHz dual core)
MOBO	Asus M2N32-SLI (nForce4 590 SLI)
RAM	2GB Corsair (two 1GB sticks)
LAN	Dual Gigabit LAN (nVidia)
HARD DRIVES	Two 150GB Raptors (10,000rpm SATA) in RAID 0, and two 750GB Barracudas in RAID 0
OPTICAL	Two Plextor PX-760A
BEAUTY	
VIDEOCARD	eVGA/Monarch GeForce 7900 GTX in SLI (702MHz core, 880MHz RAM)
SOUNDCARD	Sound Blaster X-Fi Xtreme Music
CASE	Cooler Master Praetorian 730
BOOT: 38 sec.	**DOWN: 10 sec.**

BENCHMARKS



Our current desktop test bed is a Windows XP SP2 machine, using a dual-core 2.6GHz Athlon 64 FX-60, 2GB of Corsair DDR400 RAM on an Asus A8N32-SLI motherboard, two GeForce 7900 GTX videocards in SLI mode, a Western Digital 4000KD hard drive, a Sound Blaster X-Fi soundcard, and a PC Power and Cooling Turbo Cool 850 PSU.

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air into bottom of the case. This is usually a good thing, but Monarch's fan runs too loud. Even closing the front case door doesn't mute the fan's noise. C'mon, people are trying to work here.

In performance, the Nemesis 2 holds its own against our zero-point system. We saw performance boosts ranging from 10 to 20 percent over our Lab test bed. That's pretty respectable, considering we just built the damned system two months ago!

We also compared the Nemesis' benchmarks against the two other AMD machines we reviewed recently—the overclocked Velocity Micro from the June issue and Overdrive's stunningly well-built, but unstable Gemini GX2 box that was reviewed in July. The Nemesis 2 benchmark performance fell smack-dab in the middle, with the 3GHz Gemini GX2 taking the lead. Neither SLI box could compete with the Gem's quad-SLI config, even though our benchmarks are run at fairly low resolutions. But in the end, the Gemini is almost $1,300 more than the Nemesis 2, and as we noted, it had some stability issues.

—GORDON MAH UNG

MONARCH NEMESIS 2

SIMPLE GREEN

Nicely configured and fast.

SOYLENT GREEN

Noisy; small configuration bugaboos.

8

$6,600, www.monarchcomputer.com

Copyrighted material

Wet CPU Contest

Three decadent water-coolers strut their stuff

This month we've assembled three very sassy water-coolers for your viewing pleasure. While two of them are external and one is internal, all three are fully expandable to cool every component in your rig. In other words, you can add as many water blocks to the cooling loop as you please. All of these units are quiet, powerful, and a wee bit pricey, but that's water-cooling for you: If you want the ultimate in cooling performance you have to pay for it.

—JOSH NOREM

DANGER DEN CUSTOM AMD KIT

Danger Den is one of the most popular online destinations for a la carte water-cooling parts (water blocks, pumps, radiators, etc), but it also sells pre-assembled kits using exclusive hardware. We tested a top-of-the-line kit for an AMD CPU and nVidia GPU, and to say we were impressed is like saying next month's Dream Machine will be a decent gaming rig.

Unlike every other water-cooling kit we've ever tested, the Danger Den kit is completely internal. Everything—including the radiator—fits inside the case, as long as you have a 12cm exhaust fan with enough clearance to mount the radiator. Though external installations are easier, we prefer the internal approach because it's cleaner, quieter, and sexier.

The kit includes the following parts: an AMD water block (TDX model), a water block for the GPU (Maze4 model), amazingly flexible and easy-to-install half-inch Tygon tubing, an adjustable 12V pump, a clear 5.25-inch reservoir, a 12cm fan, a Black Ice Xtreme 12cm radiator (with Pabst fan), and a bottle of MCT-5 nonconductive coolant.

The Danger Den custom kit fits entirely inside any ATX mid-tower, provided you have a 12cm exhaust fan to mount the radiator/fan assembly.

Installing the water blocks was relatively easy, we didn't even have to remove our motherboard. The only issue we experienced was that the mobo—an Asus A8N32 SLI—has a heatsink next to the CPU socket that cools the chipset. We couldn't use Asus' provided clip-on cooler because the radiator sits flush with the heatsink.

The kit performed as well as other similar kits, but we were particularly impressed by its quietude. With the pump at full speed, it's barely audible, and cranked down to its lowest setting, it's dead silent.

Our only issue with Danger Den's kit is that the included installation video shows parts that did not come with this kit. Still, performance and flexibility make this a Kick Ass cooling system.

DANGER DEN CUSTOM AMD KIT

SAFETY
Completely internal, insanely quiet, great performance, and looks trick.

DANGER
Gets very cramped in a mid-tower; instructions are for parts not included.

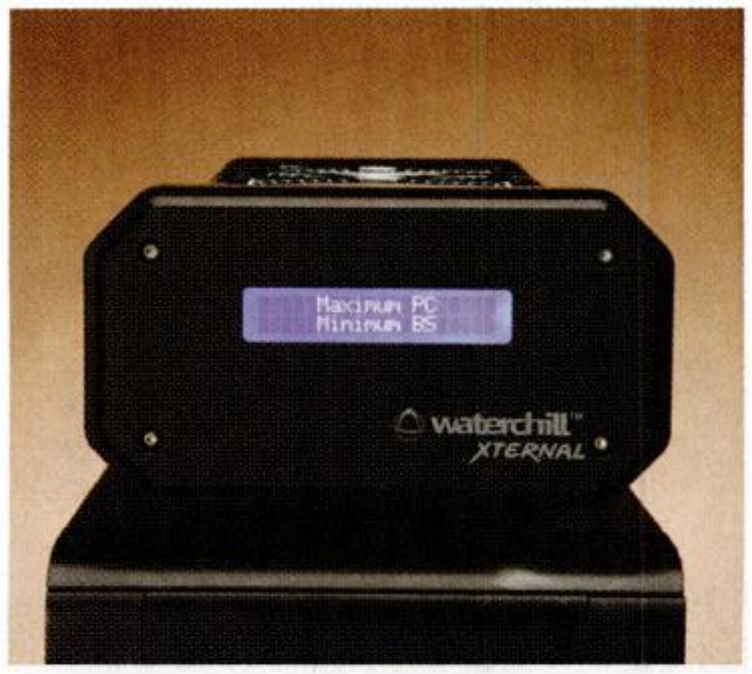
9

MAXIMUM PC KICKASS

$320, www.dangerden.com

ASETEK WATERCHILL XTERNAL

The WaterChill Xternal is Asetek's external version of its WaterChill cooling system. Overall the kit works extremely well, but it has a few minor flaws.



The Asetek WaterChill Xternal is a hardcore kit for serious water-coolers. It includes three water blocks and control-panel software that gives you complete control.

The industrial-looking cooling unit includes a dual 12cm radiator with four fans. Two 12cm fans blow down on top of it, and two more 12cm fans suck air from the bottom. Both sets of fans and the included pump are adjustable via software, and the front of the unit features a 20-character LCD screen. You can set the LCD to display water temperature, pump speed, fan speed, or a text message of your choosing (as shown). A see-through window on the side lets you see the reservoir's contents. The kit includes blocks for the CPU, GPU, and chipset; an external heat exchanger; a syringe of pink anti-algae fluid; and skinny 10mm tubing.

You'll need to remove the motherboard to install the CPU block, even on an AMD system—which is a pain. The GPU block is the same variety that caused us to kill two videocards last year, and even though our nVidia 6800 GT emerged unscathed, we don't like the two-long-screws retention method—it's a recipe for disaster. We didn't mount the chipset cooler because our Asus board includes a silent copper heat pipe for that purpose.

BENCHMARKS

TEMPS	DANGER DEN	WATERCHILL XTERNAL	KOOLANCE EXOS-LT
CPU IDLE (C)	38	39	**36**
CPU 100% LOAD (C)	45	45	**43**
GPU IDLE (C)	**42**	45	N/A
GPU 100% LOAD (C)	55	**52**	N/A

Best scores are bolded. All temperatures were measured via the onboard sensors, using the utilities provided by the motherboard manufacturer. Idle temperatures were measured after 30 minutes of inactivity and full-load temps were achieved running CPU Burn-in for one hour. GPU temperatures were measured via the Forceware drivers on a 6800 GT card. Load temps were achieved by looping 3DMark 06.

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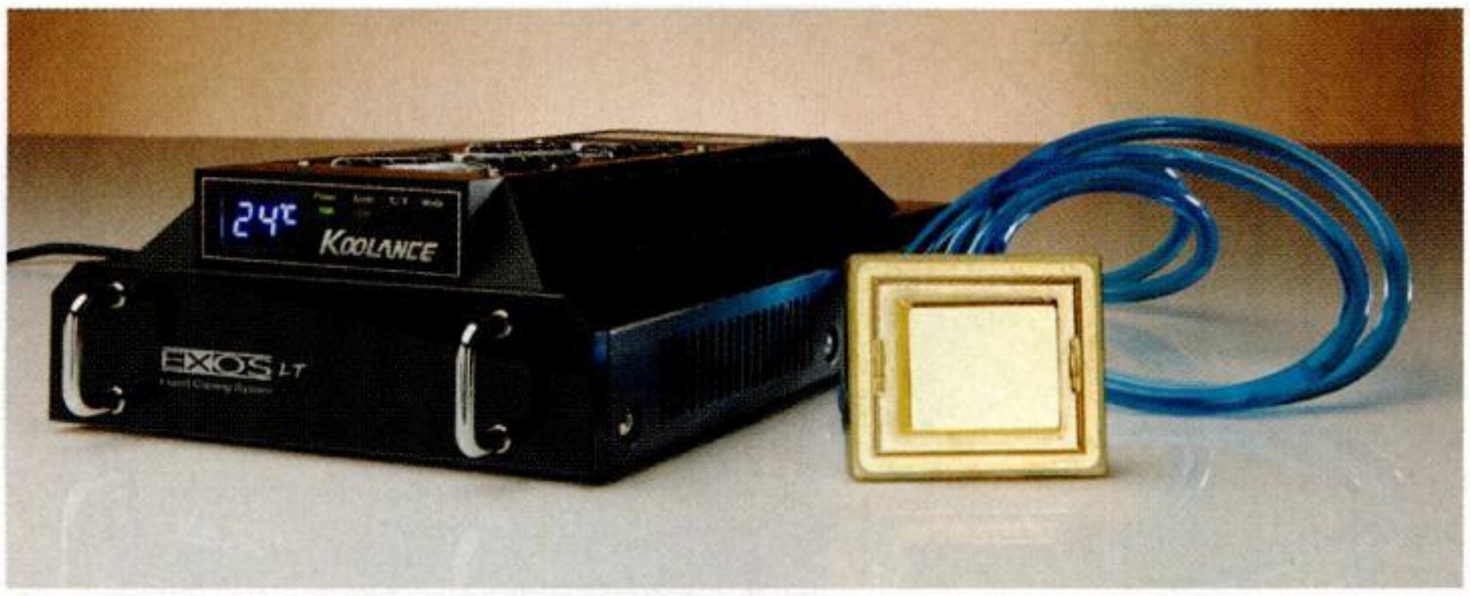

The Exos-LT is a less expensive version of Koolance's Exos 2 external cooler. It gets the job done, is cool and quiet, and adjusts fan speeds automatically.

The star of the WaterChill show is the software control panel. It's incredibly useful, and would be a real winner if it had a cleaner interface and clearer instructions. It displays fan speeds, pump speed, temperatures, and lets you tweak everything manually or set up preconfigured profiles that increase fan speeds as temps rise. We ran our tests with the fans at 60 percent (100 percent isn't necessary for proper cooling, and it's much too loud, to boot).

This kit performed as well as the other kits we tested, and it gets kudos for being the only kit to ship with three water blocks included. We love the control panel software and the sleek-yet-rugged elegance of the unit. It's expensive, but it's a freaking massive cooler with three water blocks, so the price is justified.

ASETEK WATERCHILL XTERNAL

CHILLING

Love the aesthetic, the quiet cooling, and the software.

KILLING

GPU water block is dangerous and the software isn't user friendly.

8

$350, www.waterchill.com

KOOLANCE EXOS-LT

Koolance's new Exos-LT is a cross between the too-expensive Exos 2 and the previous-gen Exos system. At just $200 (plus an extra $40 for a Koolance CPU block, which isn't included), it's the budget contender of this roundup. Of course, it's the sole CPU-only kit in the group—if it were spec'd with extra blocks, we'd expect it to be priced like the others. All in all, the Exos-LT is an excellent cooler, but it's a smidge pricey compared with the Corsair Nautilus 500 CPU cooler we reviewed in April, which costs $150 and comes with a CPU block.

Installation was the easiest in this roundup. Just attach the water block to your CPU (motherboard removal is only required for Intel CPUs), set the radiator/pump/reservoir on top of your rig, snake the tubes through the included PCI slot cover, and attach them to the water block. All told, installation should take about 15 minutes.

The Exos-LT reports the CPU temp on a small display on the front of the radiator, next to the control panel. You use the panel to select from three different fan-speed profiles. Numbers 1 and 2 keep the fans spinning at 45 percent until the CPU block's temp hits 51 C and 36 C, respectively. Profile 3 runs the fans at 100 percent, but we found this setting completely unnecessary. Our test system's temps never got out of control in either of the quieter profiles. We ran our system in mode 1 for testing, and fan speed never increased beyond a barely audible 45 percent. The Exos will also shut down your PC if its sensor crosses a critical threshold, which is handy if one of the system's two pumps fails.

The Exos-LT is about as "plug-and-play" as it gets. Just install it, set it to profile 1, and never think about it again. It cools well, it's quiet, sports awesome features, and looks bitchin'. The only problem is its comparatively high price for its category. While we'd rather have the Exos-LT, budget-minded folks would be happier with the Corsair Nautilus.

KOOLANCE EXOS-LT

RADIATOR

Light, quiet, easy to install, easy to control, and expandable.

IRRADIATED

Expensive, and doesn't include a CPU block.

9

$240, www.koolance.com

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Asus Z62J

Build your own notebook in a half-hour or less!

Wouldn't it be great if you could get a DIY notebook and install your components without having to crack open the manual?

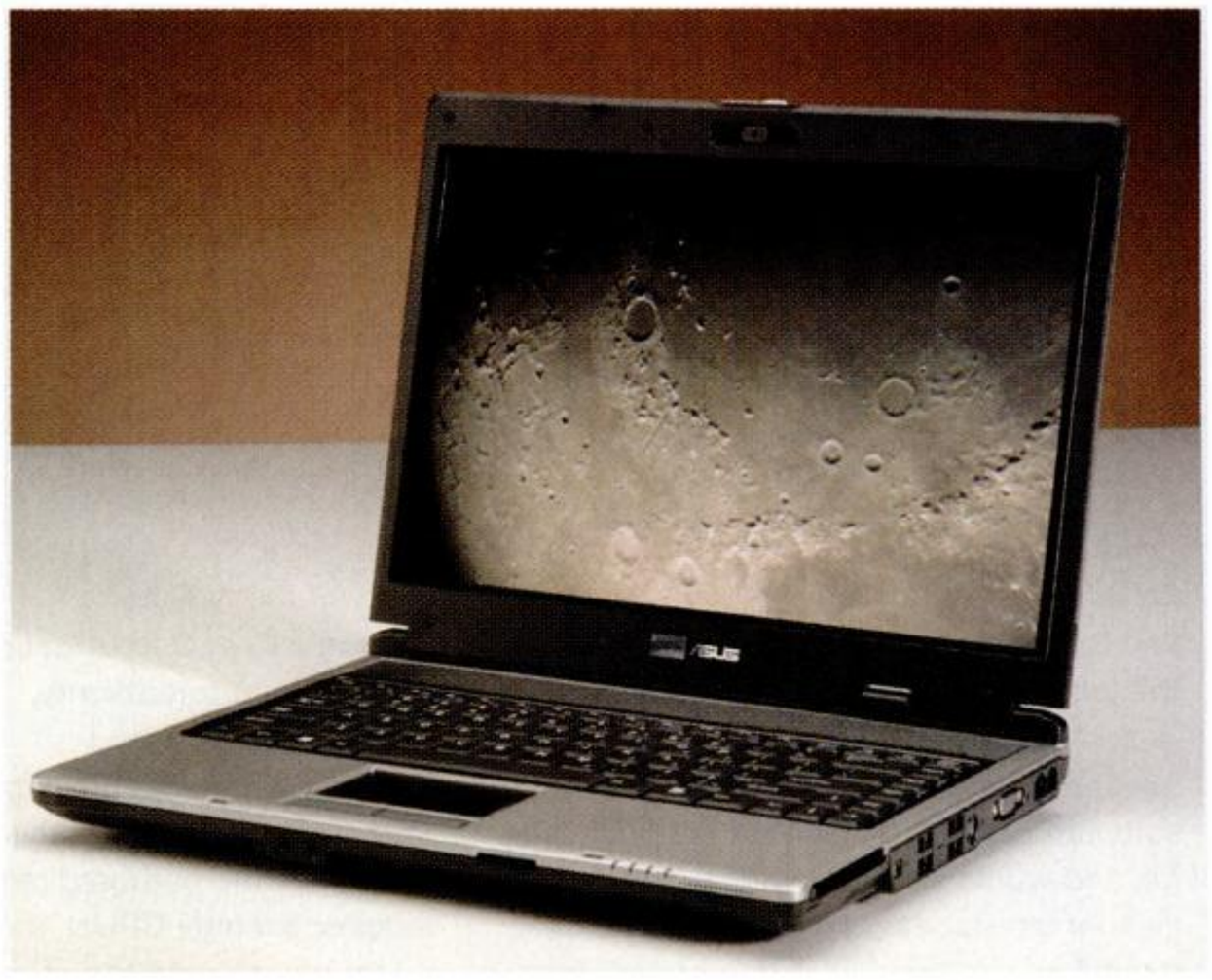
That's what Asus expects people to do with its compact new Z62J notebook. This 5.5-pounder features a 14-inch glossy screen, a built-in camera, an nVidia GeForce Go 7300 videocard with a 128MB frame buffer, and support for Intel's Core Duo/Centrino Duo CPUs. The best part of the Z62J is the ease with which it can be built—anyone can put this notebook PC together. Really.

Asus forgot to include the driver CD (which contains the manual) when it shipped the notebook to us, but who the hell needs it? To install components there's no need to look for a hidden panel to remove the top panels and keyboard; just flip the notebook over, pop off three panels, and begin assembling. We installed a 100GB Seagate SATA drive, 512MB of DDR2/667 Corsair RAM, an Intel Core Duo T2500 CPU, and an Intel 3945ABG Wi-Fi card in less than 15 minutes. The only real rocky moments were squeezing in the hard drive, and figuring out the wire orientation on the Wi-Fi Mini PCI Express card.

Mini PCI Express cards are much smaller than Mini PCI and faster too.

Our worst moment came when we dropped a screw on the floor. As every builder knows, screws that get dropped on the floor immediately disappear into the abyss, home to your lost socks. Because this is a common problem, we recommend that notebook-kit makers bundle extra screws in a plastic bag labeled "extra screws," as finding a replacement for a proprietary screw is impossible.

That might not be a problem in the near future, however. Intel is pushing hard for interchangeable standards in notebooks, so it's possible that you'll eventually be able to swap display panels, power bricks, keyboards, and screws if its Common Building Block (CBB) initiative takes off. Intel foresees notebooks with the same customization of desktops one day. The Z62J is actually one of the first notebooks to adopt the CBB initiative.



You can build you own thin-and-light with Asus' Z62 series.

You can install all of your hardware without removing the notebook's keyboard.

The build quality of the Z62J is good, but not great. The shell is plastic, the keyboard is a bit spongy, and the mouse buttons are hard on tender thumbs. The 1280x800 Color Shine screen, however, is gorgeous and bright. Sadly, the Z62J lacks ExpressCard support, which can be useful for adding high-bandwidth I/O items like RAID. Of course, if forced to choose between PC Card and ExpressCard, we'd take the legacy PC Card, but it would be optimal to have *both* options.

Asus actually sells two different versions of the Z62, the J version with the GeForce graphics, and an F version with slower but more battery friendly integrated Intel graphics.

The Z62J isn't perfect, but we can't imagine finding a notebook that's easier to build. The biggest issue for notebook DIYers is where to get these suckers. Asus says the kit will be available for purchase from **http://usa.asus.com/event/z62j/wtb.html**.

—GORDON MAH UNG

SPECS

CPU SUPPORT	Socket 479 Core Duo/Core Solo/ Pentium M
CHIPSET	Intel 945PM
GRAPHICS	nVidia GeForce Go 7300 128MB
I/O	SATA 3G
OPTICAL DRIVE	12.7mm drives (reviewed with TS-L632)

ASUS Z62J

+ THE BIG SLEEP

You can literally build this dual-core ready notebook in 20 minutes!

– THE BIG EASY

A steep price tag makes the Z62J a tough sell in the days of $800 notebooks.

7

$780, www.asus.com

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IT'S
NOT
WHAT
YOU
PLAY

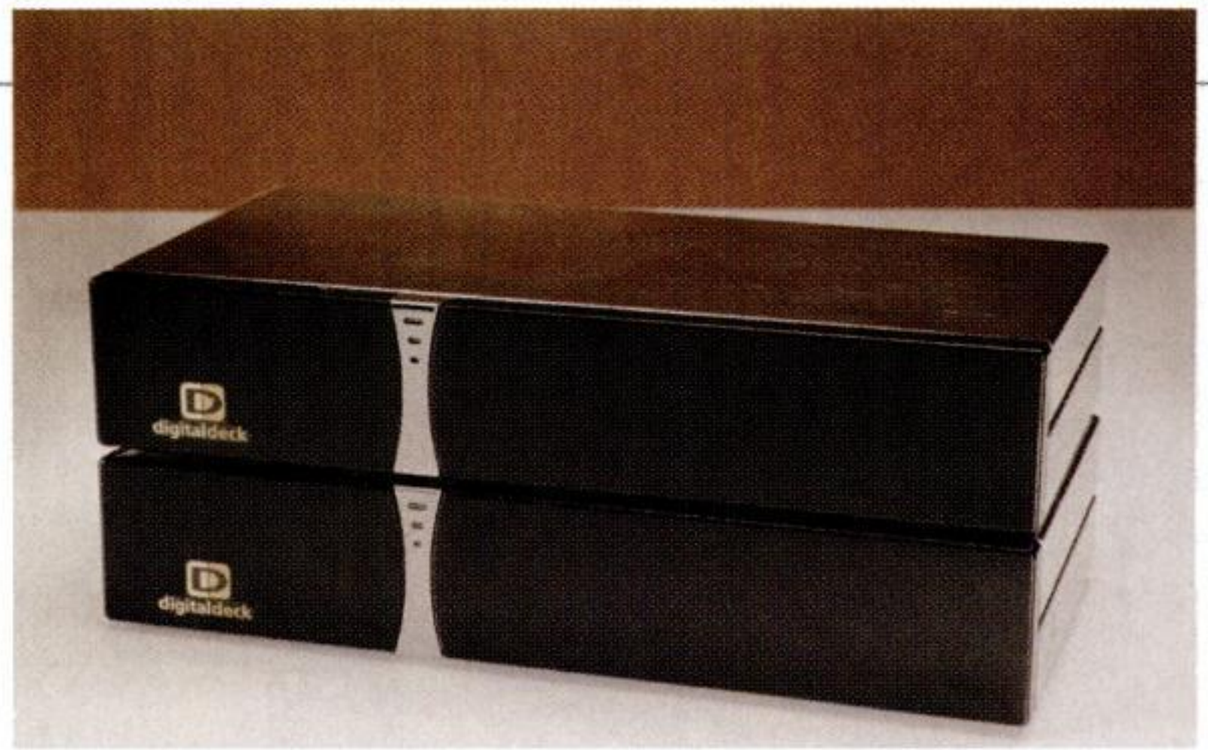
IT'S
WHAT
YOU
PLAY
IT
ON.

1-888-FALCON-1
WWW.FALCON-NW.COM

Falcon
Northwest

Digital Deck Media Connector

We can't wait for version 2.0



Each Digital Deck Media Connector not only streams audio and video from any of four consumer-electronics devices over Ethernet, it can also control them using infrared emitters.

Boxes that stream video and music from your PC to your TV or stereo system are nothing new. And if that's all Digital Deck's Media Connectors did, we'd have yawned and barked "Next!" So when the company told us its boxes not only stream A/V content from any consumer-electronics (CE) device over Ethernet, but that they can also *control* those devices, we sat up and growled "Show me!"

As it turns out, the Digital Deck lives up to most of its promises—as long as you're willing to accept a few rough edges and limitations, including this one: The whole shebang relies on wired Ethernet.

Still interested? OK, here's how it works: Each Media Connector is outfitted with an Ethernet port, four sets of analog A/V inputs, three dual-channel infrared outputs, and one set of A/V outputs. Plug any combination of hardware (set-top box, DVD changer, VCR, etc.) into the box's inputs, and it will encode those signals and send them to your PC.

Digital Deck's PC server software can record these streams to your hard drive, or it can route them in real time to any other Media Connector on the same network. The receiving Media Connector decodes the stream and outputs it to an attached TV or A/V receiver. Digital Deck tells us a high-end PC can manage as many as five Media Connectors, but we had only two for the review, so we couldn't test that functionality. While sending different video streams from the hard drive on our 3.4GHz P4 to each Media Connector, we noted CPU utilization that ranged from just 4 percent to spikes of more than 50 percent. We wouldn't recommend playing a demanding game at the same time.

You can also stream any unencrypted digital content (video, music, or photos) stored on your PC; online digital photos from a *Flickr* account; or any unprotected music, podcasts, or playlists in your *iTunes* library (videos and songs you've purchased from the iTMS, however, cannot be streamed due to Apple's Fairplay DRM).

But here's where Digital Deck's concept gets even cooler: You can remotely control up to six CE devices attached to each Media Connector. The included universal infrared remote sends commands over the network to IR emitters plugged into the remote Media Connector and attached to the CE device's IR receiver.

The absence of digital A/V inputs and digital-video output is puzzling. There's a fourth set of analog inputs, and a second nonfunctional USB port, hidden behind the front panel.

WHERE THE RUBBER MEETS THE ROAD

If we were evaluating the Digital Deck on concept alone, we'd give it a 10/Kick Ass verdict; but because we're also judging the company's execution, our opinion isn't quite as positive. For starters, none of the Media Connectors' four sets of A/V inputs is digital. There's no component-video input, and there's only one S-Video input (the other three are lowly composite video). There's no HDTV support, and the two USB ports are nonfunctional.

The Media Connector does have digital audio outputs (optical and coaxial), but no digital video output (you do get component, as well as S- and composite-video). The well-designed 10-foot user interface looks best with a component connection, but it's almost as good with S-Video.

Configuring the Media Connectors to control your CE devices can be a maddening trial-and-error process: Digital Deck's database of IR codes includes only manufacturer names, not specific model numbers, and there can be dozens of permutations. The system has other issues, too. To move up in the channel listings, for instance, you must counter-intuitively push the remote's page-down button. And the system's DVR function will only record programs to your PC's hard drive, even if your set-top box has DVR capabilities of its own.

Digital Deck has an awesome concept on its hands, but we can recommend this first iteration only to ardent early adopters willing to tolerate its shortcomings.

—MICHAEL BROWN

SPECS

VIDEO INPUTS	1 S-Video, 3 composite
AUDIO INPUTS	4 stereo RCA
VIDEO OUTPUTS	1 component, 1 S-Video, 1 composite
AUDIO OUTPUTS	Analog: 1 stereo RCA; digital: 1 optical, 1 coaxial
VIDEO FORMATS	MPEG-1, MPEG-2
AUDIO FORMATS	AAC, AC-3, MP3, WMA (no DRM support)
PHOTO FORMATS	BMP, GIF, JPEG, PNG, TIFF

DIGITAL DECK CONNECTOR

+ BAKED POTATO

Inexpensive solution in comparison to a custom system.

− COUCH POTATO

Difficult to set up; relies on wired Ethernet.

7

$500 ($300 per additional room), www.digitaldeck.com

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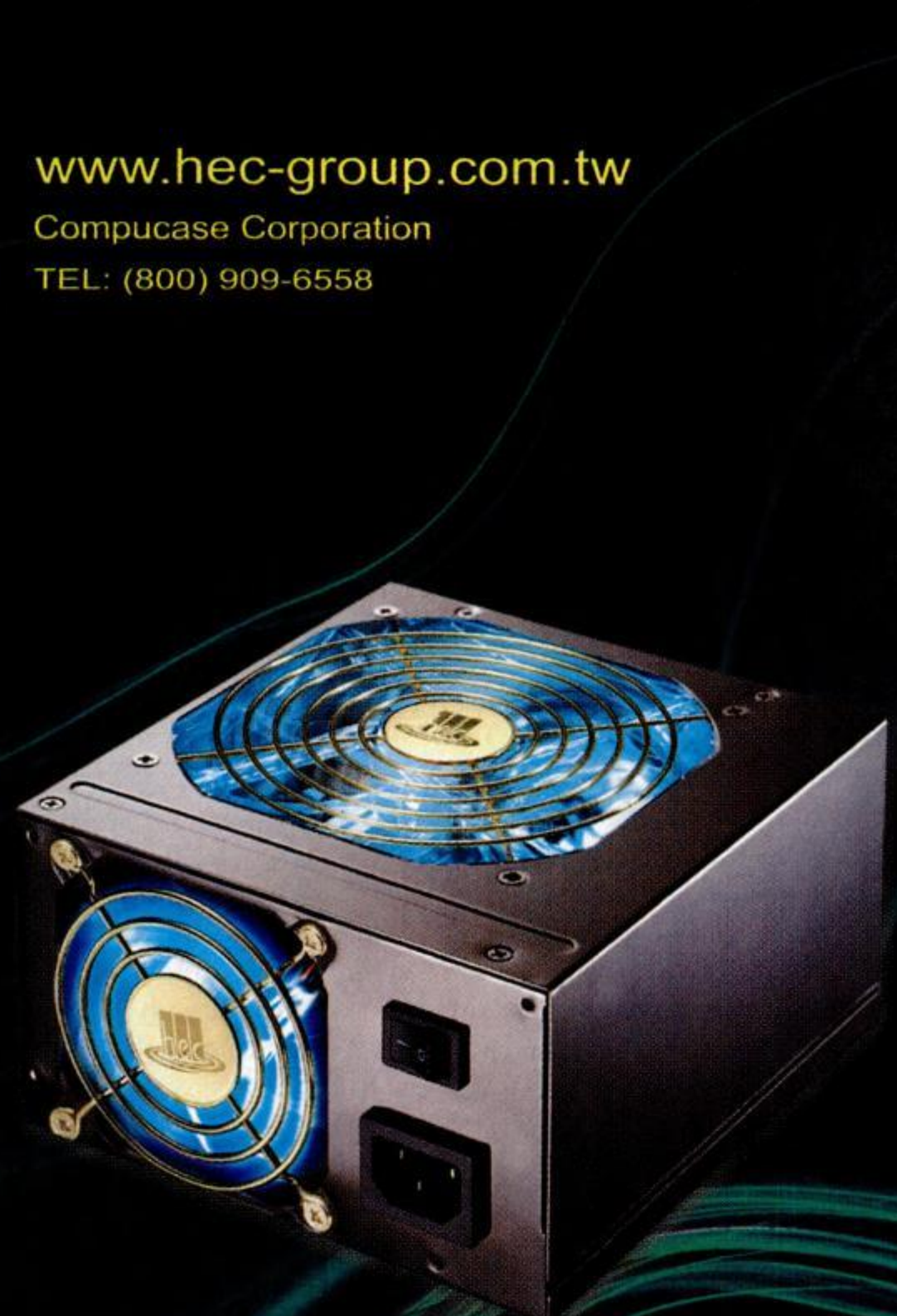

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Diamond XtremeSound

A bargain soundcard that's faster than the X-Fi?

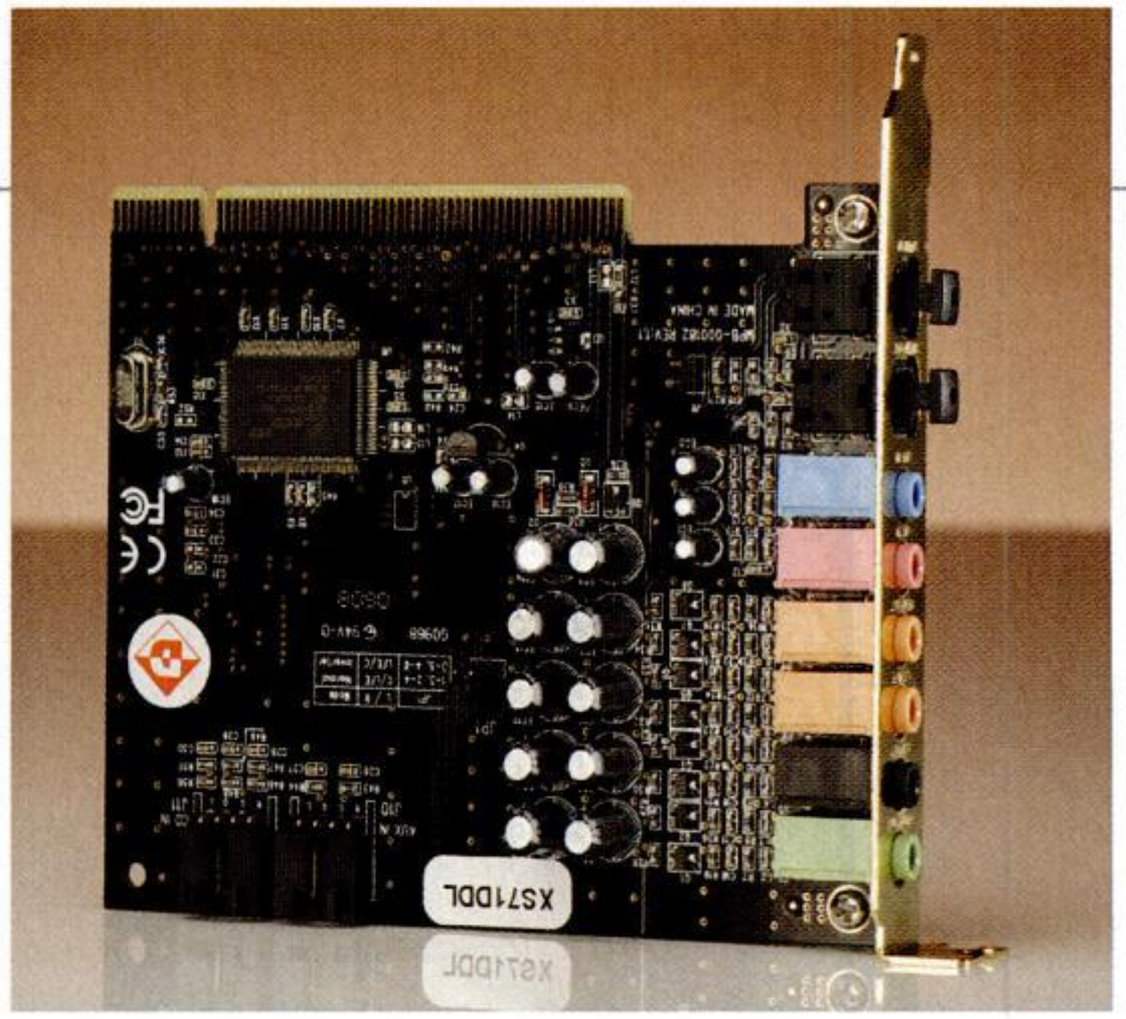
We were so in love with the old Diamond Monster Sound that it wasn't until our recent move that we finally sent the unsupported, driverless card to hardware Valhalla.

Well, a reincarnated Diamond Multimedia is back, pushing a soundcard dubbed XtremeSound that sports real-time Dolby Digital Live encoding. Based on C-Media's CMI 8768, the chip does away with external audio codecs by having those capabilities integrated directly into the chip. C-Media claims some DSP capabilities, but we're a little skeptical. And we're damn sure the Dolby Digital Live encoding is host-based.

But people who care about Dolby Digital Live—the ability to encode a surround sound source on the fly into Dolby Digital—probably don't care whether it's done on the CPU or soundcard, as long as they have the feature.

The XtremeSound performed quite well in analog mode during our gaming tests. In fact, in both *3DMark* and *FEAR*, the XtremeSound turned in significantly better frame rates than our motherboard's integrated sound. And shockingly, the XtremeSound performed on par with Creative's X-Fi. We suspect we're at the point where a dual-core 3.46GHz Pentium Extreme Edition 955 beats a dedicated DSP, even one as powerful as the X-Fi's. Of course, your mileage will vary based on your CPU.

All that performance goes out the window, however, when you turn on Dolby Digital Live. With the heavier load on the CPU, the XtremeSound drops into third place with its frame rates dropping from 141fps to 114fps in *FEAR*. You'd think that with a dual-core CPU, the Dolby Digital encoding would off-load to the idle core, but it didn't work that way.



Diamond's XtremeSound sports a single-chip design that integrates all its codecs, and it offers real-time encoding to Dolby Digital.

Frame rates are pretty pointless if the card sounds like crap. Using a set of *eargasmic* Etymotic Research ER-4 earphones, we listened to the XtremeSound render audio in *Battlefield 2*. The short verdict is that the X-Fi still annihilates all comers with its subtle audio cues and excellent occlusion effects. While the XtremeSound performs better than integrated sound, it can't hold a candle to the X-Fi.

So where does that leave the XtremeSound? It's a capable soundcard for gaming and is one of the few ways to hook up your PC to your Dolby Digital system via a digital output, something even the X-Fi can't do.

— GORDON MAH UNG

XTREMESOUND 7.1 — **8**

$60, www.diamondmm.com

Seagate Barracuda 750GB

Meet the new 7,200rpm performance king

Big companies rarely take chances, and Seagate—the world's largest drive maker—is no exception. It has always played second fiddle to Hitachi when it comes to the 7,200rpm hard drive capacity war, and even though Seagate drives are reliable and semi-speedy, they've never delivered industry-leading or even outstanding performance. Well, those days are over. Seagate has shipped the world's first perpendicular desktop hard drive, which shatters the capacity record, and is also the fastest 7,200rpm drive we've ever tested.

The tenth-generation 7,200rpm (7200.10 for short) Barracuda drive pulls out all the stops. While the rest of the hard drive world is still using longitudinal recording, where the magnetized bits are laid down on the recording media in a flat orientation, Seagate has already moved to a new, more efficient way of packing bits onto platters. In perpendicular recording the bits "stand" up, so they are oriented perpendicular to the recording media. Perpendicular drives pack more bits on each platter, allowing for massive increases in capacity, as witnessed by this drive's unbelievable 750GB capacity (the next-biggest drive is a lowly 500GB).

The 7200.10 Barracuda sports a 16MB buffer, a SATA 3G interface, and four 187GB platters. During testing, the drive set benchmark records in several categories, including sequential read speed, *IOmeter*, a 5GB read, and *Doom 3* loading. This drive kicks serious ass across the board. Not since the Raptor's arrival have we seen such a hard drive smackdown. The speed doesn't come without a price, however; the drive ran nuclear hot under load without cooling, and its application index score was lower than the WD400KD. (It was higher than the newer WD500KS, which means it might be time to revisit this benchmark.)

Folks, there's a new 7,200rpm sheriff in town, and its name is Barracuda.

—JOSH NOREM

Seagate's 7200.10 Barracuda is the world's first desktop hard drive to take advantage of perpendicular recording technology.

BARRACUDA 750GB — **9**

$500, www.seagate.com

MAXIMUM PC KICKASS

BENCHMARKS

	BARRACUDA	WD5000KS
HD TACH 3		
RANDOM ACCESS TIME (MS)	13.4	**13.2**
BURST RATE (MB/S)	**256**	191
AVG. SEQUENTIAL READ (MB/S)	**66**	62.2
H2BENCHW		
APPLICATION INDEX*	**27.3**	27
OTHER		
DOOM 3 LOADING (SEC)	**28**	31
5GB READ (SEC)	**82**	99
IOMETER 50 PERCENT RANDOM WORKLOAD (IO/SEC)	**255**	214
OPERATING TEMP WITH NO FAN**	**53**	48

*Best scores are bolded. *The application index is a real-world script of six applications. The score is based on the time it takes the drive to complete the scripts. **Hard drive temperatures measured using S.M.A.R.T. data, as reported by the Speedfan utility.*

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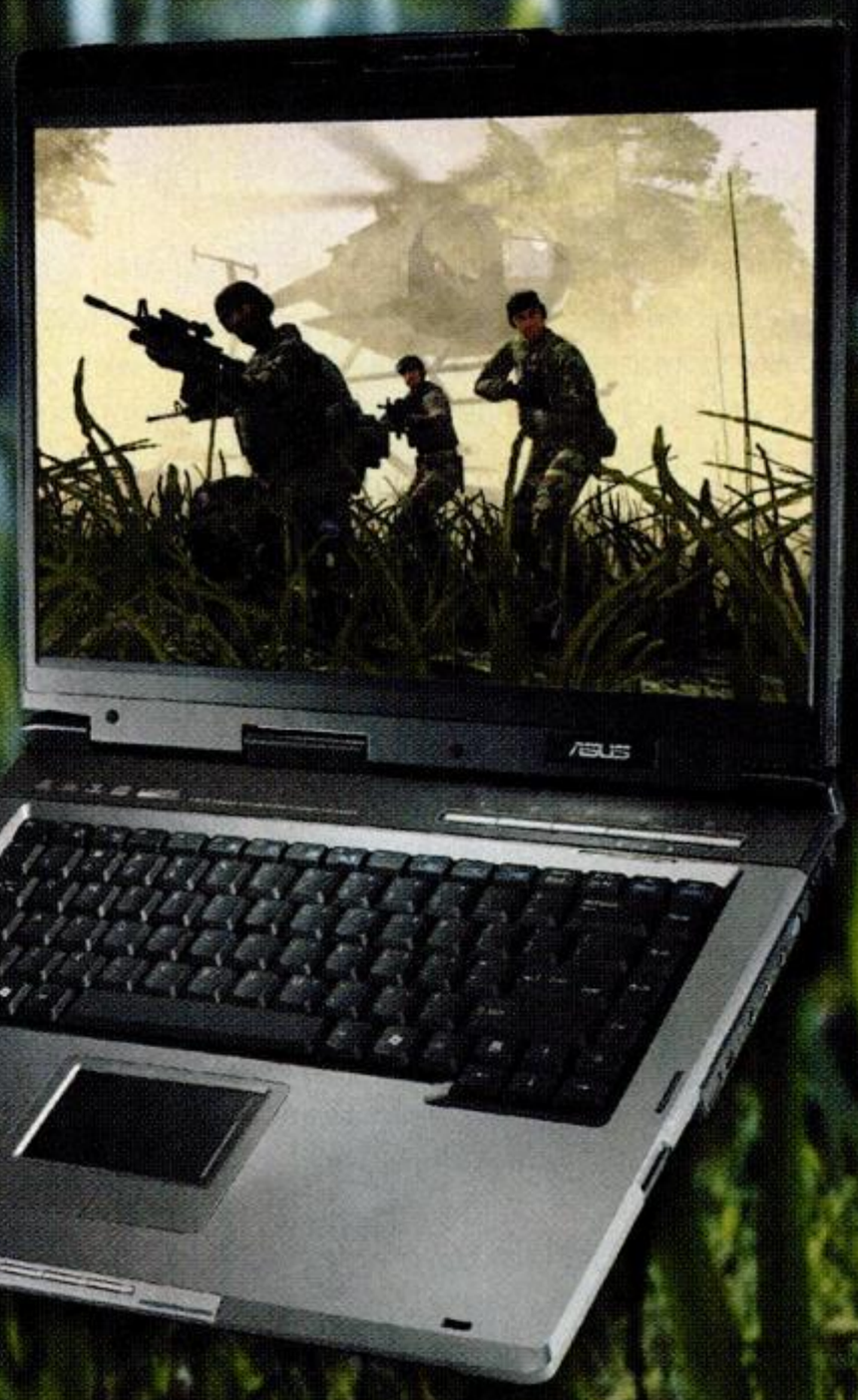

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iPod Doodads

More gear you didn't know you needed for your iPod

The onslaught of third-party iPod accessories continues unabated. This month, we examine two portable speaker systems and one docking station that's built like a brick, um, outhouse.

—MICHAEL BROWN

DREAMGEAR I.SOUND MAX

Dreamgear obviously knows that speakers are the single most lucrative segment of iPod add-on products: The company offers eight models, including the i.Sound Max.

This bowtie-shaped speaker doubles as an iPod docking and charging station, but its port connector mates only with iPod-style USB cables. We won't knock the i.Sound Max for its cable choice; instead, we'll slap it around for its tinny sound, its lack of video output, and the fact that this pricey portable doesn't come with a carrying pouch.

Dreamgear's i.Sound Max puts form over function, but we dig its remote control.

Four 1.26-inch neodymium drivers overemphasize high frequencies to produce annoyingly sibilant vocals, and they proved utterly incapable of displacing enough air to pump meaningful bass through the ear-canal-size ports on either side of the enclosure.

On the upside, we hope other iPod speaker manufacturers study the i.Sound's remote: It controls not only the volume and playlist and track selection, but it can also activate the iPod display's backlight.

DREAMGEAR I.SOUND MAX

BOLO TIES
The best iPod remote we've seen; syncs your iPod.

BOW TIES
Metallic highs and gutless bass response.

4

$100, www.dreamgear.net

IPORT FS-2 FREE-STANDING MUSIC SYSTEM

If you think it's foolish to drop $200 on a docking station for a $300 iPod, we won't even mention iPort's $1,100 model FS-5. Whoops. In any event, we're reviewing the model FS-2 here, and we think its price tag is warranted.

iPort's FS-2 Free-Standing Music System can be expanded to provide balanced audio and video runs of up to 250 feet using Cat5 cable.

This is the best-engineered docking station we've laid hands on. Spring-loaded arms hold any model iPod snugly inside the weighted base, so there's no worry of damaging the iPod's docking connector. The large button in the center of the dock glows white while streaming music, and red while transferring data; a button-push toggles between the two modes. This means you can remove the iPod from the dock without first soft-ejecting it within *iTunes*. The other illuminated multifunction buttons control volume and track selection. A hidden infrared receiver can be used with the optional remote control ($50) or any programmable remote.

A multi-pin cable carries analog audio and video from the base to a connector block outfitted with stereo RCA and line-level audio outputs, as well as composite and S-Video outputs. This block can be discretely hidden behind an A/V receiver, while the ripcord connector cable can be split to reach your PC as much as six feet in the opposite direction. Expensive, but worth it.

IPORT FS-2 MUSIC SYSTEM

GOLD LEAF
Impeccable design, superb quality, and expandability.

GILT LEAF
Expensive; remote control costs extra.

9

MAXIMUM PC KICKASS

$200, www.iportmusic.com

KENSINGTON SX 2000 SPEAKERS

We're big fans of the NXT speaker technology at the heart of Kensington's SX 2000: This little system puts out big sound and satisfying bass without a subwoofer. But we expect just a little more for 160 clams.

The NXT transducers at the heart of Kensington's SX 2000 sound terrific; it's too bad the rest of the package doesn't measure up.

The SX 2000 has no sync capability and no capacity for displaying digital photos or video on a TV monitor; heck, it doesn't even come with a remote control. It will recharge your iPod while it's docked, but that's about it. Without a remote, you must use the iPod to change tracks; and without any bracing mechanism to support the player while it's docked, we're concerned about the stress placed on the iPod's Dock connector.

The all-in-one formfactor is marvelous for a bookshelf or tabletop, but the 18-inch-wide package makes an awkward PC partner, because the only way to get a proper stereo image is to plop it right in front of your monitor.

KENSINGTON SX 2000 SPEAKERS

PANCAKE BREAKFAST
NXT's flat-panel speakers sound fabulous.

PANCAKE MAKEUP
No remote control; won't sync your iPod; overpriced.

6

$160, www.kensington.com

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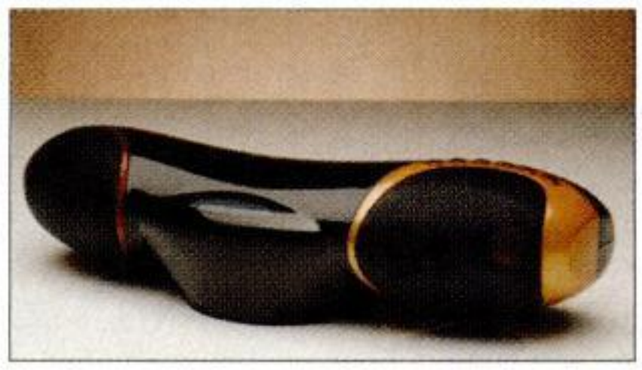
BLUETOOTH AUDIO



Saitek A-250 2.1 Wireless Speaker

Saitek's A-250 Wireless 2.1 Speaker is like a roadside accident. You know you should look away, but you can't stop staring. Maybe it's the colors. Maybe it's the allure of wireless audio. Or maybe it's the uncanny resemblance to Admiral Ackbar, architect of the Rebel Alliance victory in the Battle of Endor.

Whatever the reason, there are better ways to get your portable-speaker fix: any MP3 player and Cambridge SoundWorks' delicious PlayDock MP3, for instance. Sure, it's not the same as streaming music from your PC, but you accomplish much the same goal.

But, let's get back to the A-250. The speaker communicates with media-player software on your PC via a Bluetooth transceiver. Just plug the transceiver into a USB port, turn on the speaker, and wait five to 10 seconds for the two to sync. Launch your favorite media player, push Play on the speaker, and music pours out.

The A-250, however, is finicky about the software it will play with. It shunned *Windows Media Player 10* and *Rhapsody*. *iTunes* streamed only if we initiated playback on the PC, but the speaker's Play/Pause and Track-forward and -back buttons did nothing. We finally achieved success with Creative's *MediaSource* and Yahoo's *MusicMatch Jukebox.*

But the music that emerged from the A-250's drivers (two one-inch aluminum cones and one three-inch, down-firing subwoofer) was marred by whiney highs, ill-defined bass, and the near absence of stereo imaging: Think $40 boombox. And unlike other Bluetooth devices we've tested, you can't direct Windows' event sounds to your local speakers—everything gets streamed to the A-250. So move along, there's nothing to see here.

—MICHAEL BROWN

SAITEK A-250 2.1 SPEAKER **4**

$130, www.saitekaudio.com

PRINT SERVER

IOGear Multi-Function Print Server

Multi-function printers are as handy as a pocket on a shirt. They can print, they can scan, they can fax. But the PCs attached to your network can only use them for printing. That's where IOGear's USB Multi-Function Print Server comes in.

Plug this palm-size device into your router and connect it to your printer's USB port, and any computer that can access your network can make use of all three of the MFP's functions. But we were disappointed to discover that this otherwise handy gadget doesn't eliminate our biggest problem: the need for a host PC.

If you have a noisy, heat-producing computer in your bedroom, you might not want to leave it running 24/7. But that doesn't mean you won't be using a laptop with a wireless Internet connection in the living room and decide you need to print or fax a document. Do you really want to walk down the hall to fire up the PC just so you can use the printer? Or maybe you want to locate your printer somewhere other than right next to your desktop PC. These are the scenarios where a print server should be most useful.

IOGear's print server isn't wireless, so your printer will still need to be in close proximity to your router, but the fact that it requires the host PC to be powered on is just plain annoying. And the appeal of its ability to enable remote devices to also use an MFP's scanning and faxing functions is further mitigated by the fact that the server is outfitted with a slug-slow USB 1.1 port. Bottom line: We're not impressed.

—MICHAEL BROWN

IOGEAR PRINT SERVER **5**

$100, www.iogear.com

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SIN Episodes: Emergence

Episodic gaming makes its first appearance with an entertaining shooter

Looking for a hardcore, single-player, you-versus-the-world, first-person shooter? *Emergence* is your game!

Episodic games are widely regarded as the saving grace of the gaming industry. Instead of spending years creating 20-hour-plus full-length games, developers can build five-hour chunks of a game, and release them more frequently and for a lower price over the Internet. *SIN Episodes: Emergence* is one of the first A-list episodic titles we've seen, and if it's any indication of what's to come, episodic content will be a good thing.

***Emergence* puts you in the shoes of the world's toughest cop—no, not Jack Bauer—as you try to bring down the evil SinTek corporation and its buxom leader, Elexis Sinclair. The usual first-person-shooter clichés are in full effect: The corporation is out of control, testing on human subjects, and in general playing God. Your mission is to save the day.**

***Emergence* makes good use of *Half-Life 2's* Source engine. The game is visually appealing and the outdoor environments (which are more complex than *HL2's*) provide an excellent backdrop for the game's carnage. Carnage is the really the only way to describe what you'll encounter in the first *SIN* episode—there's a nearly endless stream of SinTek goons to slaughter as you attempt to bring down the company. Your arsenal is limited to three guns: a pistol, a shotgun, and a submachine gun. Each is effective in certain situations, but you'll need to use all three, and their alternate-fire modes, to succeed, especially at the higher difficulty settings.**

That brings us to our next point: *Emergence* is hard. It's not difficult in a frustrating or annoying way, but even at the default difficulty settings, you need to use cover and attack intelligently, or even the weakest enemies will kick your ass. You should only increase the difficulty level if you can reliably make headshots—otherwise, you'll spend a lot of time loading saved games. Beat the game and you'll unlock HardCORPs mode, which gives you just one life (and removes your ability to save the game). This should deliver a challenge suitable for even the hardest of the hardcore.

We can't wait for the next installment!

—WILL SMITH

EMERGENCE **8**

$20, www.sinepisodes.com

ESRB: M

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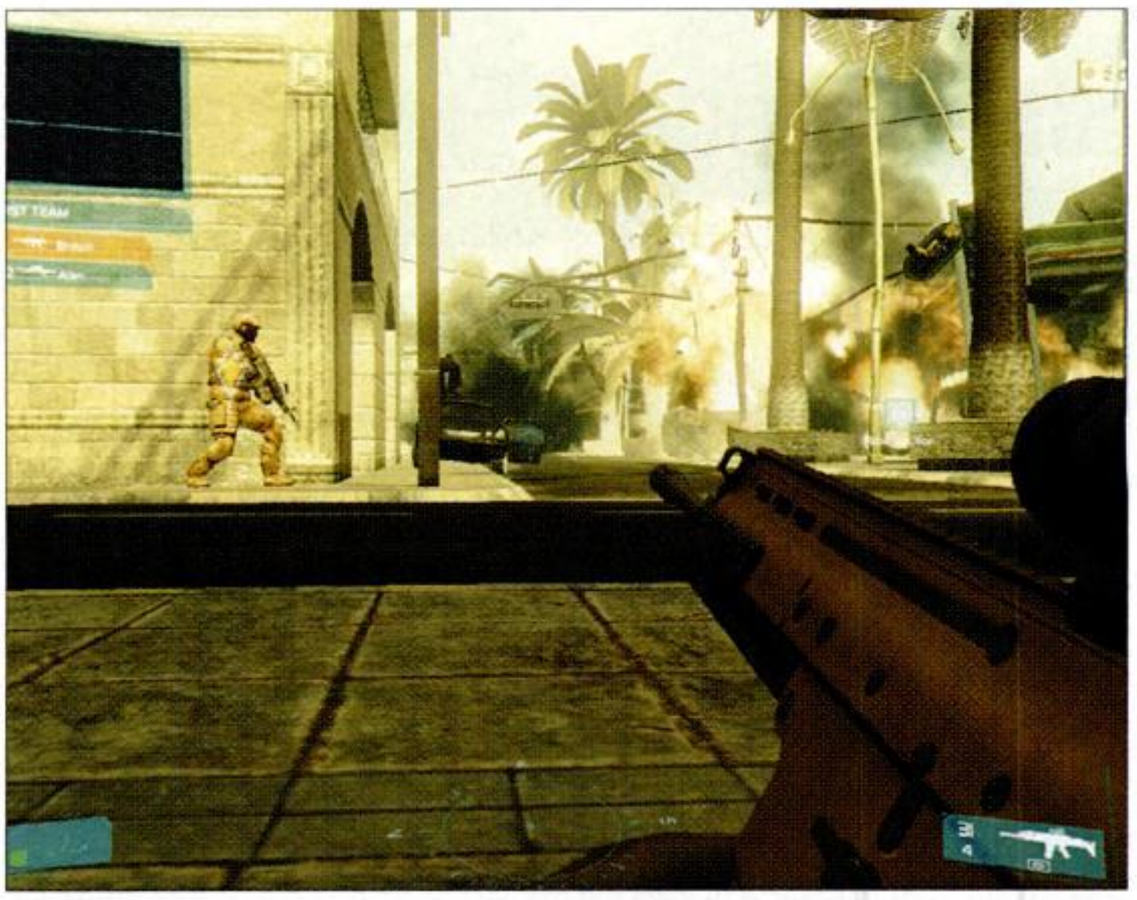
Ghost Recon: Advanced Warfighter

Run 'n' gunners should run the hell away

Ghost Recon games have always been serious tactical shooters—when they appear on the PC anyway—but the latest installment requires an even more tactical approach than its predecessors. Not only do you need to carefully plan your every move in this near-future shooter, you also need a rig from the near future to run the game. Sadly, that's the case even if you disable some of the eye candy that worked well on the Xbox 360.

We're usually not averse to insanely high system requirements, but when we fired up *Ghost Recon: Advanced Warfighter* on an SLI rig with dual 7800 GTX cards, 2GB of RAM, and an Athlon X2 4800+, and couldn't run the game at 1280x1024, we figured something was afoot. After several patches and some heavy tweaking, the game's performance improved slightly, but we don't understand why some features remain disabled on the PC. We especially missed the direct video feed from our squad mates' head-cams—the Xbox 360 displays a full render, while the PC version shows just a wireframe. That's disappointing.

Performance issues aside, the game looks brilliant, delivering huge, realistic environments through which to stalk your prey, and stalking is exactly what you'll need to do. Charging into battle with guns blazing is a sure-fire way to a sudden death. Instead, you'll need to plan each of your moves carefully, using the excellent tactical map, and direct your squad mates with the same care. For them to be effective, you need to place each squad mate carefully, so they can suss out enemy positions and protect your back from the inevitable counterattack.



Don't let *GRAW's* tactical-shooter pedigree fool you. This game delivers plenty of Jerry Bruckheimer-esque explosions!

While we prefer the more hands-on approach that the PC version of *GRAW* gives squad leaders, your squad mate's AI leaves a lot to be desired. If you tell a squaddie to wait in the cover of a protective corner, he's just as likely to casually stroll around the corner into a hail of bullets as he is to wait in the place you specified. It's natural selection at work, but it's extremely frustrating when your only sniper is taken out during the first moments of a 30-plus-minute-long mission. Oddly, the enemy AI is quite good; they use cover effectively and make reasonably good decisions about when and how to attack.

Were the AI a little less suicidal, the game's high-difficulty level wouldn't be such a problem. But because you can't rely on your comrades to behave the way any life-loving soldier would, you not only have to contend with an extremely difficult first-person shooter, but you also have to keep your squad alive long enough to keep you covered. It quickly stops being fun and becomes tedious.

This poor fellow has no idea what's about to hit him. In case you were wondering, it's a single .50-caliber round.

The game's saving grace is the kick-ass multiplayer co-op mode. On the PC version, you can play through the entire single-player campaign with real-life humans taking the place of the drooling AI. (The Xbox 360 version replaced co-op on the single-player missions with a handful of specially designed, but inferior co-op maps.) Playing co-op with your buddies is fun with a capital F, and it gives you a great opportunity to practice your team-based strategies. Voice comms are a must if you want to succeed, so if you're not playing on a LAN, make sure you bring your headset—a good time will be had by all.

—WILL SMITH

Take a good look at the tactical map; you'll spend a lot of time here, scouting the area and planning your route.

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Co-op really kicks ass; the tactical action can be very satisfying.

JACOB MARLEY

You'll spend more time positioning your squad than you will fighting the enemy.

8

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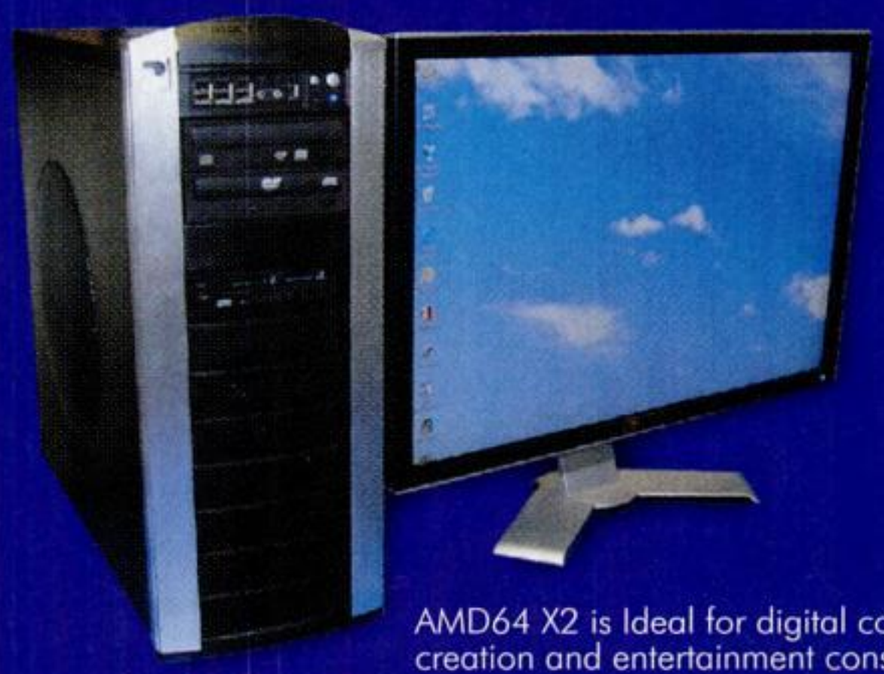

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Tomb Raider: Legend

Easily the best outing Lara Croft has had this century

***Legends* marks Lara Croft's return to what she does best—exploring and defiling tombs.**

While it's certainly not going to revolutionize third-person action gaming, *Tomb Raider: Legend* delivers a few hours of solid entertainment. You'll explore new and old locations from adventurer Lara Croft's past—including a whole bunch of tombs filled with elaborate booby traps and intricate puzzles.

The *Tomb Raider* games have always succeeded in evoking an Indiana Jones-like sense of wonder at the artifacts left behind by long-dead civilizations, and *Legends* follows suit. The tombs look beautiful in all their next-gen glory. Everything is normal-mapped, dynamically lit, reflective, and shiny. The gameplay is at its best inside these ancient chambers, where you'll have to solve a variety of physics-based jumping and climbing puzzles, in addition to fighting man and beast.

Whenever Lara leaves the ruins in favor of more modern settings, the game falls flat. The run-and-gun levels—all the Japanese levels and the village ambush—would be more fitting in a first-person shooter. And the vehicular levels are a drag, even if you play with a gamepad. The motorcycle is virtually impossible to control—at best, you swerve wildly out of control from one area to the next. Combat sequences are briefly entertaining, but the pathetic enemy AI renders the gunplay overly simplistic. The boss battles are also annoying, requiring you to jump, duck, and shoot, without any real strategy or skill. They're simply endurance contests between you and the AI.

Crystal Dynamics tore a page from the *Indigo Prophecy* playbook with the cutscene mini-games. During many of the cutscenes, you'll be presented with simple, quick tasks—usually tapping a button or one of your movement keys. Lara's fate depends on your ability to perform the action in the time allotted. We're not fans of pre-rendered cutscenes, but anything a developer does to make them more interesting is OK by us.

While you can play *Tomb Raider* with a mouse and keyboard, a gamepad makes more sense—with the game's automatic aiming, there's really no reason to muddle around with the unwieldy keyboard config.

—WILL SMITH

LEGEND **7**

$40, www.tombraider.com, ESRB: T

Rise of Nations: Rise of Legends

Less equals more of the good stuff

***Legends* has some of the best art direction you'll ever see in a game—it's jaw-dropping gorgeous!**

If you're expecting *Rise of Legends* to offer "more of the same but with some refinements and better graphics," as is typical of many sequels, you're in for a surprise—but a pleasant one.

Big Huge Games pulled out all the stops to deliver something that looks and feels entirely new, while maintaining *Rise of Nation's* core gameplay mechanics (such as attrition and national borders). The historical backdrop is gone, replaced with a new fantasy setting that dusts off the magic-vs-technology debate. *RON's* 18 playable factions are replaced with just three very balanced races: the tech-focused and steampunk-inspired Vinci; the magically minded and *Arabian Nights*-inspired Alin; and the Mayan-esque Cuotl, which straddle the fence of the other two. And finally, *RON's* four resources are also gone, replaced with just two (energy and wealth). These reductions let you focus on getting to the good stuff—battles—as quickly as possible.

The three-part campaign is huge, with a much more developed narrative than *RON's*. Unfortunately, the story itself is riddled with cliché and gets lost at times because of the open-ended nature of the Conquer the World campaign, which lets you choose from several territories to attack each turn. (Each campaign centers on one of the three races, and each has more than a dozen territories.) Only a handful of inhabitants must be captured to advance the storyline, but each one you add to your rule adds resources to your cause. On a few occasions, particularly in the Alin campaign, it seemed that vital story info was missed because of the way we chose to advance. And, while there are several inventive missions in each campaign, they all suffer from "capture all enemy cities and eliminate all resistance" redundancy.

Still, thanks to the eye-popping visuals and pyrotechnics (this is the best-looking RTS we've played), unit variety, and pure cathartic fun the game brings to the table, it's possible to overlook these relatively minor flaws.

–STEVE KLETT

RISE OF LEGENDS **8**

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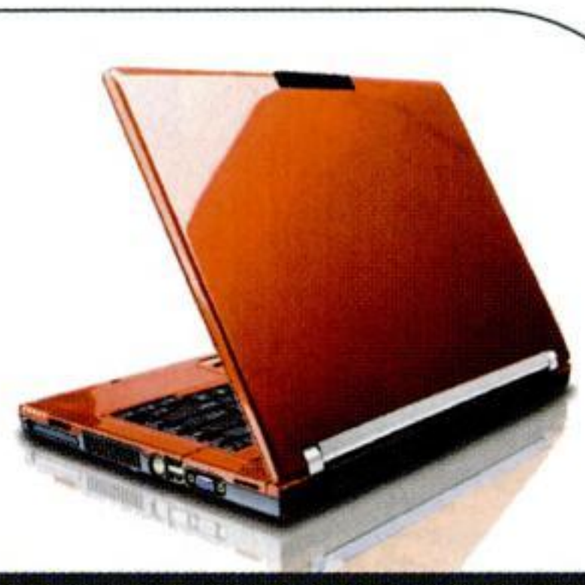

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AMD Athlon™ 64 FX-62 (Socket AM2)	$2239

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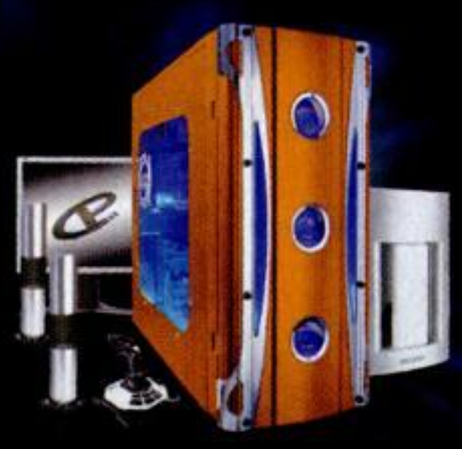

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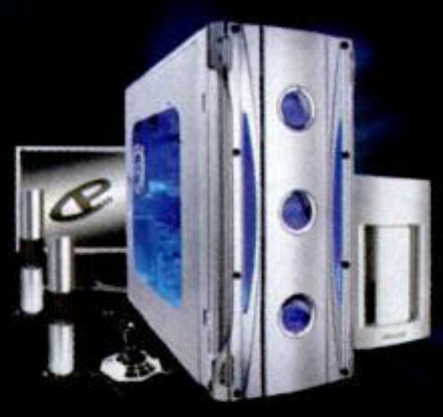

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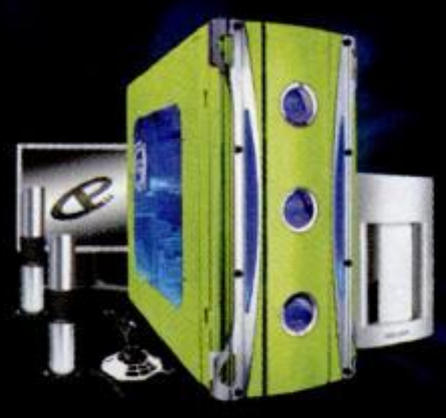

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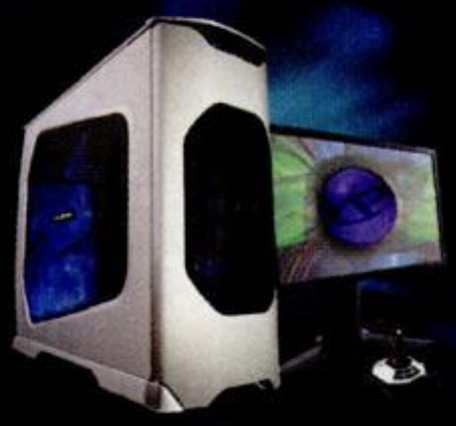

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We tackle tough reader questions on...

✓Monitor Specs ✓Speedfan ✓DirectX 10 ✓Rubber Bands ✓QuickTime

SPECIOUS SPECS

I read the article on three monitors in the June issue, and try as I might, I could find no mention of refresh rate, contrast rating, or brightness rating for any of these screens. Did I miss something, or aren't these factors important for choosing a display?

—Sam Chase

MANAGING EDITOR KATHERINE STEVENSON REPLIES: Space constraints prevent us from including all of an LCD's specs in our reviews, so we choose the few we think are most useful to readers. While contrast ratio and pixel response times indeed have a bearing on an LCD's overall quality, we don't include those specs because there is currently no standard method for measuring/reporting those numbers among manufacturers. Therefore the specs themselves aren't a reliable indication of the relative differences among LCDs (unless they happen to be from the same manufacturer). Instead, we prefer to judge these qualities based on our controlled and comparative real-world tests, using a variety of applications and digital content.

SPEEDFAN SNAFU?

*In your article regarding the **Speedfan** program, you stated that, "we have no idea what Temp3 is, or why it's running at -128 C." I'm quite surprised that computer geeks like you would be clueless on something as simple as that. The Temp3 is the temperature of the power supply. Since you claim you were using an Asus A8N32 board, you should plug the temperature sensor pin of your power supply into the "PWR_FAN" connector.*

—Mike

SENIOR EDITOR JOSH NOREM RESPONDS: Thanks for the advice, Mike. As a matter of fact, we did plug the three-pin temperature sensor from our PSU into the PWR_FAN connector, but all that does is show us the speed at which the PSU fan is spinning. On the Asus A8N32 board that we're running, Temp3 is independent of the PWR_FAN connector—no matter what you plug into that connector, the Temp3 reading is always -128 C.

As we said in the article, a temperature that low is indicative of an unused temperature sensor on the motherboard, or at least that's what the author of *Speedfan* told us. That means that Asus chose not to connect a sensor to that lead on the chipset, which is a fairly common practice. It's like having a pipe under your house that goes off into nowhere. Sure, there's a pipe there, but there's nothing in it and it serves no purpose. When *Speedfan* reports extremely strange temperatures, it's safe to ignore those sensors.

UPGRADE TO DIRECTX 10

I recently won an Alienware Area 51 5500 with a 7900 GT graphics card. I was wondering if I should upgrade it with a second 7900 GT, since the motherboard supports SLI, or if I should wait for the next generation of graphics cards that will come out with Windows Vista? I want my PC to support DirectX 10. Do current-generation graphics cards support DirectX 10?

—Adam Donn

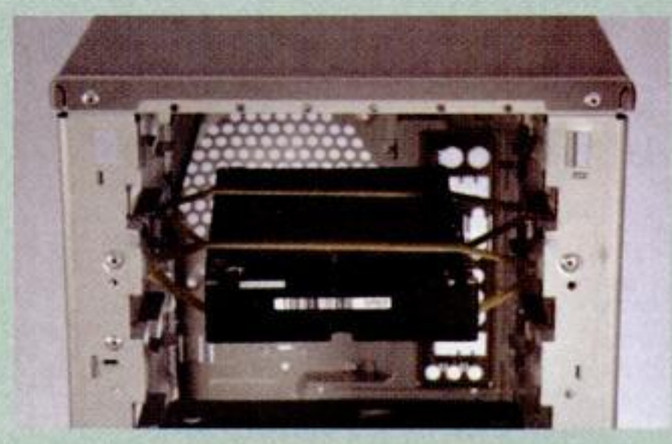
EXECUTIVE EDITOR MICHAEL BROWN RESPONDS: Congratulations on your good fortune! To answer your upgrade question, we're nearly always of the opinion that there's no time like the present if you have the funds. Besides, no one outside Microsoft really knows when Vista will finally ship. As for DirectX 10, no current-generation videocard will be compatible with the new features. DirectX 10 will not only require GPUs to support a new geometry-shader function, but an altogether new unified shader architecture in which a com-

Are You Guys Daft?

The July issue's "DIY Guide" has an unsafe and unwise tip on suspending your hard drives using rubber bands. Rubber has the unique property of drying out in a closed environment, and this could really lead to damage if a dry, cracked band, which is supporting your hard drives and data, breaks.

More to the point, it might be easier and safer to use rubber grommets in between the hard drives and mount points. While still using the metal screws to hold the drives in place, the rubber would act as a buffer for any movement and dampen the sound.

—Dennis Cruise



SENIOR EDITOR JOSH NOREM RESPONDS: All valid points, Dennis, but I assure you: We would never, ever suggest or recommend anything to readers that we didn't thoroughly vet, and that we wouldn't use in our own rigs. Of course, over time the rubber bands will dry up, but we're talking about an exceedingly long time. Because we're using high-quality rubber bands, and they're kept warm and dry in the case, they should last for several years. Another alternative would be to use thicker elastic thongs, such as the ones Antec uses to suspend the hard drives in its P150 case.

Sure, rubber grommets do a good job of quieting hard drives, but that mod process is more difficult because you typically have to find the grommets, then find some longer-than-normal screws, and drill bigger holes. We believe the rubber-band mod achieves the same result, and is easier to implement.

CUTCOPYPASTE

In July's In the Lab article about Liquid Pro liquid-metal thermal material, we printed the wrong URL. The correct URL is **www.coollaboratory.com.**

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mon shader engine executes geometry-, pixel-, and vertex-shader functions. These changes will require substantial updates to the silicon.

OPTICAL DRIVE ADD-ON

Regarding the project in your July "DIY Guide" for camouflaging an optical drive cover: Before you glue the bay cover to the disc tray, you should apply a series of adhesive rubber feet to the back of the bay cover that almost touch the eject button; then you can simply press the lower-right corner of the bay cover to pop the tray open. It's easy to adjust those rubber feet with a utility knife. With this trick you will need a flexible adhesive like Superlock tape (from Radio Shack) or Velcro, instead of Krazy Glue.

—Terri

SENIOR EDITOR JOSH NOREM RESPONDS: That's a great tip, Terri. Thanks for the heads up.

256-BIT BUS OR BUST!

I read in your June 2006 issue that the nVidia GeForce 7600 GT was the way to go for "The $1,000 Gaming Rig." Actually, as luck would have it, before that issue arrived, I was already in the process of creating a $1,000 gaming rig, with similar parts planned out. I was going to go with the XFX GeForce 6800 GT, but upon reading that issue, I decided to go with the 7600.

Here's my problem: I went to Pricegrabber.com and the only thing I could find was the same card, but with a 256-bit memory bus instead of the 128-bit bus you listed in the magazine (see ***http://tinyurl.com/mvnyy****). Is this the same card, only better? I mean is it worth the same rating as the one you used in your $1,000 rig? Pricegrabber.com is amazing, but there are so many different parts with seemingly no differences, or very small ones, that it can be confusing. What's the truth?*

—Bryan Westall

EXECUTIVE EDITOR MICHAEL BROWN RESPONDS: The description of the 7600 GT on Pricegrabber is incorrect when it states that the card sports a 256-bit memory interface—all 7600 GT cards have a 128-bit memory interface.

The third-party manufacturers who build videocards based on the 7600 GT, however, do offer videocards with the chip and its supporting memory running at different clock speeds. That's one of the ways in which they differentiate their product from competitors who use the same GPU.

The card you're looking at in that particular link is XFX's 7600 GT XXX Edition, and it's clocked higher than a stock 7600 GT: The core runs at 590MHz, versus a stock 560MHz, and the memory runs at 800MHz, versus a stock 700MHz.

XFX also offers three other flavors of 7600 GT cards, each of which runs just a little slower than the XXX Edition. The best way of knowing exactly what you're buying is to check the SKU. Every manufacturer and every retailer uses the card's unique SKU to manage their inventory and keep the different parts straight.

Here's how XFX's four SKUs break down, but you might also want to compare these to competitors' cards and their specs (and software bundles, if you care about bundled games):

- **PV-T73G-UDL3: 560MHz core, 700MHz memory**
- **PV-T73G-UDF3: 570MHz core, 725MHz memory**
- **PV-T73G-UDE3: 580MHz core, 750MHz memory**
- **PV-T73G-UDD3: 590MHz core, 800MHz memory**

QUICKTIME ON THE CD

I can't believe that you tech heads actually put ***QuickTime*** *on your disc! Good grief! Everyone knows* ***QuickTime*** *is like a virus/adware! What are you going to do next, start including* ***Real Player*** *too?*

—Dave K

EDITOR IN CHIEF WILL SMITH RESPONDS: OK you can all stop sending letters about *QuickTime* on the disc now. For folks who don't get a disc with their version of *Maximum PC*, we're talking about the fact that our recently redesigned disc interface now uses *QuickTime* to play short videos. The majority of the interface is built in *Macromedia Director*.

While we agree that early versions of *QuickTime* sucked, the latest versions (from *QuickTime 6* on) are reasonably well-behaved software citizens. The app is easy enough to remove, you can disable the tray icon, and you can prevent the app from hijacking all your file associations. The *Maximum PC* editors have *QuickTime* installed on their machines.

We chose *QuickTime* for one reason: It delivers the best video quality at the smallest file size. Smaller videos give us more space for apps, utilities, and games. Still, we do recognize that not everyone wants *QuickTime* installed on their system, so going forward, the disc interface will give you the option to bypass the *QuickTime* check. MPC

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BLUE SCREEN SURVIVAL GUIDE!

We've all experienced the Blue Screen of Death, but what causes it? What does it mean? What are we to make of an "IRQL Not Less or Equal" error? Find out next month in our easy-to-follow BSOD guide!

TOP SECRET HARDWARE!

We've got some hot-new hardware in the Lab, but we can't tell you about it because you don't have level G17 security clearance. Don't worry: One month isn't *that* long of a wait—and besides, absence makes the heart grow fonder.

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JEFFREY STEPHENSON'S

Unidyne PC

Call it the power of suggestion, but we're compelled to sing the praises of Jeffrey Stephenson's PC tribute to the Shure 55 Unidyne microphone. His admiration for the mic's iconic Machine Age design is understandable enough; that this uncanny replica is made almost entirely from wood is plain amazing! Using a blown-up PDF diagram of the mic, Stephenson cut and shaped the various parts (including the lug and mounting system) out of lightweight, easily milled Michigan basswood. Aluminum spray paint covers the body and flat black paint coats all the recesses.

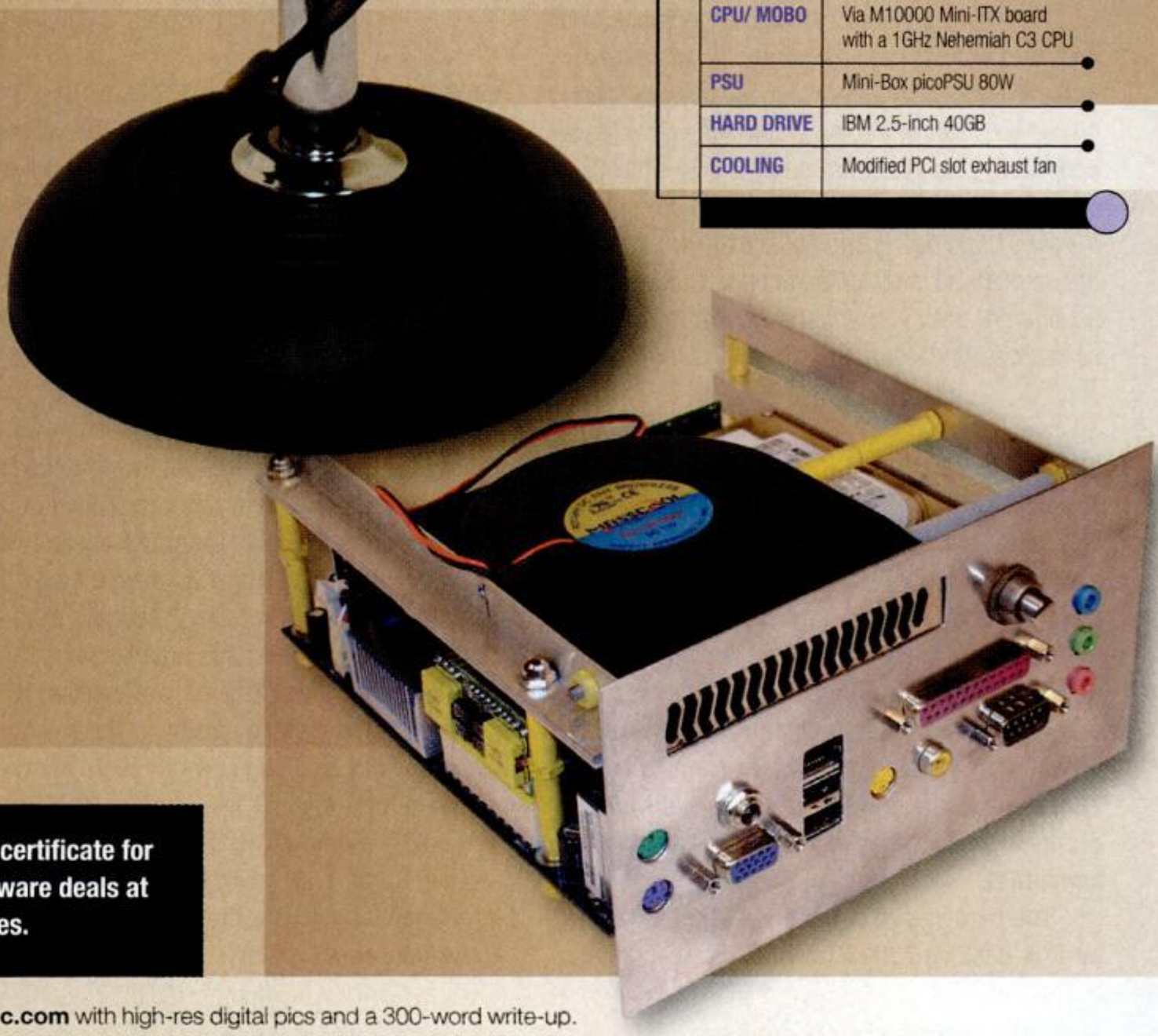
The PC parts are housed in a totally self-contained cartridge-style unit that slides into a hollow compartment in the mic's body.

Stephenson bound all of the PC's cables into a single sleeve of heatshrink, to simulate an actual mic cable. "The problem is that the components attached to the cable bundle become a permanent part of the PC," he says.

SPECS

CPU/ MOBO	Via M10000 Mini-ITX board with a 1GHz Nehemiah C3 CPU
PSU	Mini-Box picoPSU 80W
HARD DRIVE	IBM 2.5-inch 40GB
COOLING	Modified PCI slot exhaust fan

Stephenson mounted his PC on a full-size mic stand (with cast-iron base) that he modified for desktop use.



For his winning entry, Jeffrey Stephenson wins a $500 gift certificate for TigerDirect to fund his modding madness! See all the hardware deals at www.tigerdirect.com, and turn to page 100 for contest rules.

If you have a contender for Rig of the Month, e-mail **rig@maximumpc.com** with high-res digital pics and a 300-word write-up.

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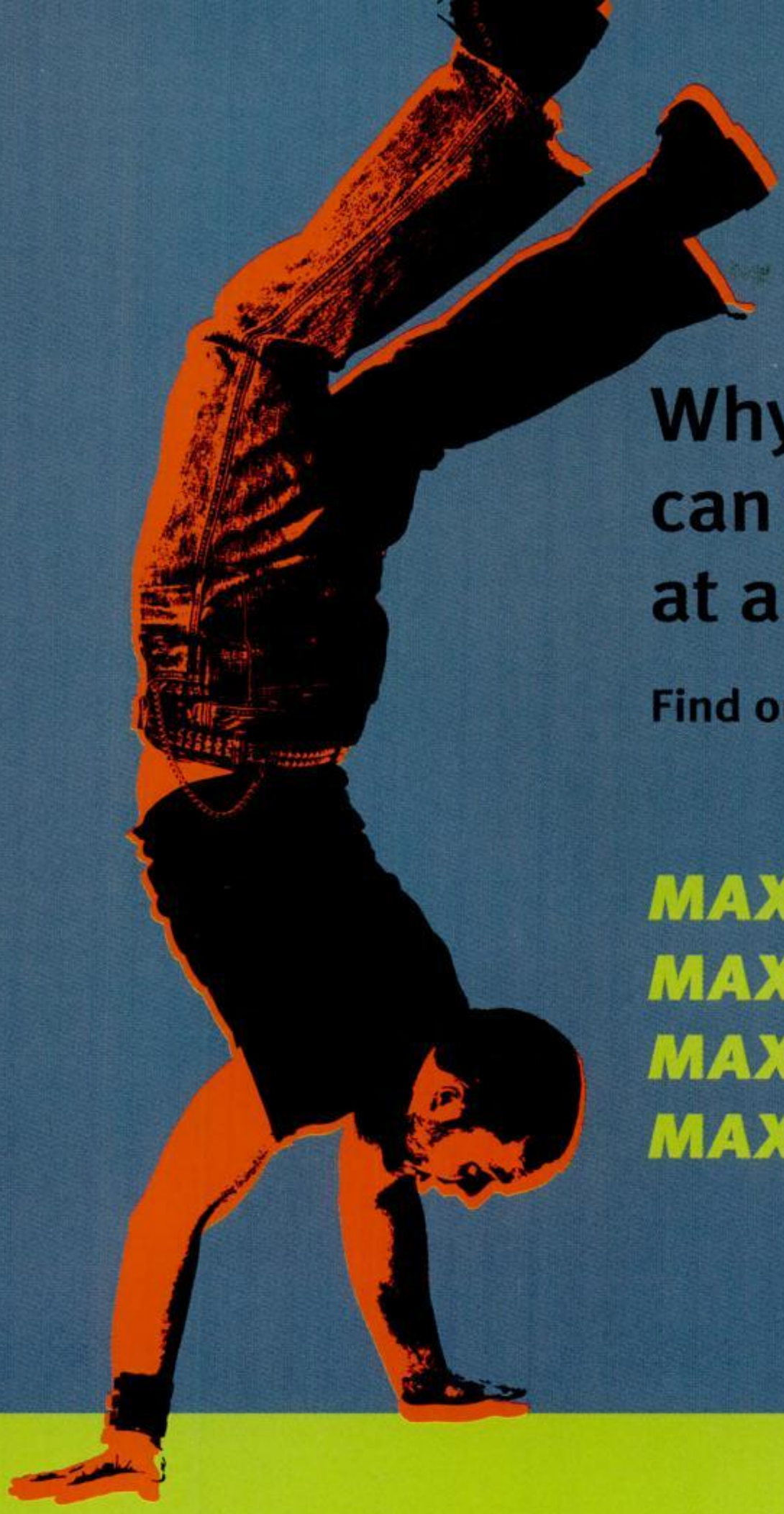

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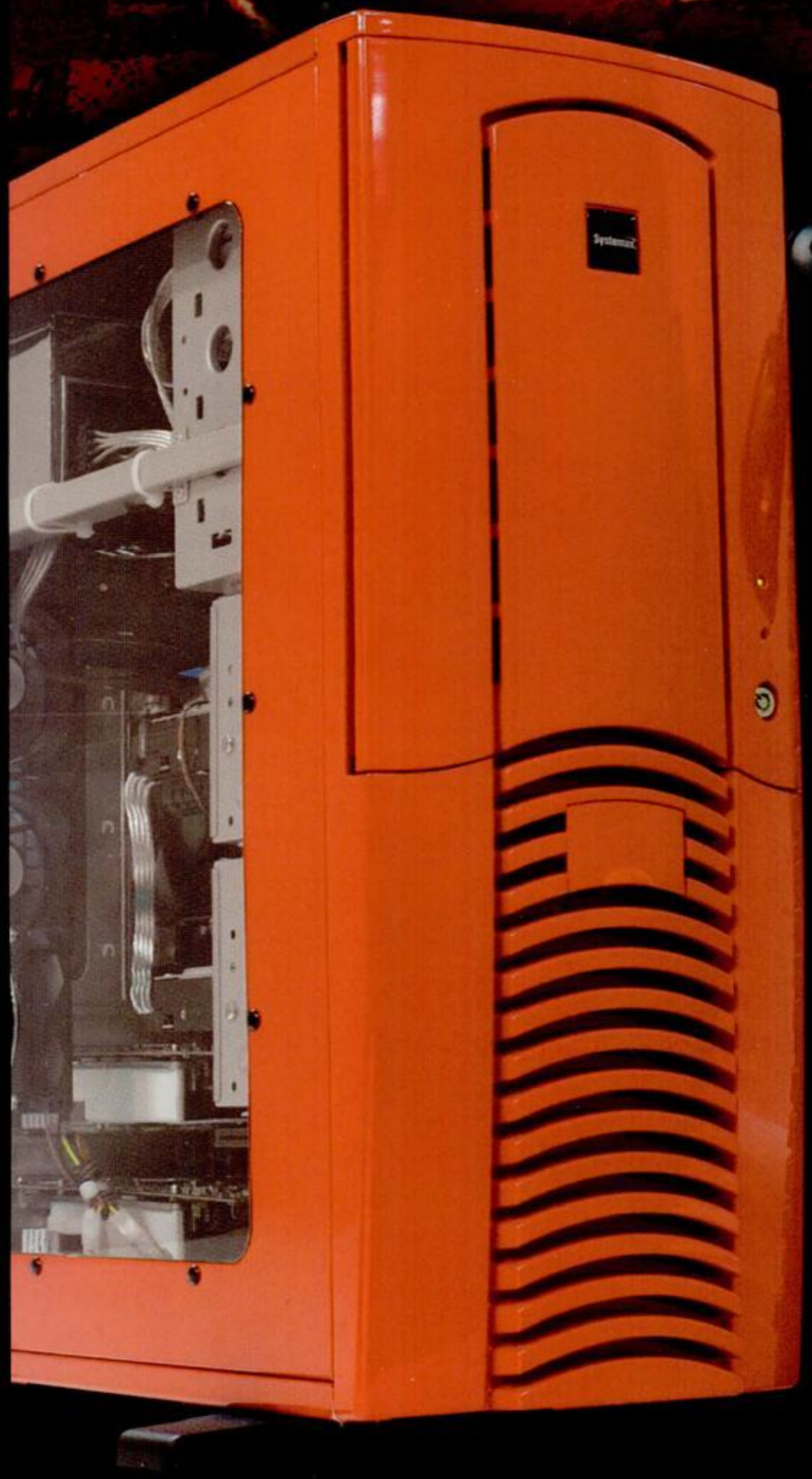

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